

**UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Klamath Falls Resource Area**

**Finding of No Significant Impact
Johnson/Sheepy Riparian Reserve Vegetation Treatments
EA OR 014-02-04**

Background:

The Interdisciplinary Team for the Klamath Falls Resource Area, Lakeview District, Bureau of Land Management has completed an Environmental Assessment (EA) and analyzed a proposal to conduct understory thinning within Riparian Reserves in the Johnson Creek and Sheepy Creek subwatersheds, which are tributary to Jenny Creek and the Klamath River. The project will contribute to meeting the goals of the Aquatic Conservation Strategy to maintain and restore forest communities within Riparian Reserves. The proposed project area is located in the portion of the Jenny Creek watershed that is within the Klamath Falls Resource Area. The proposed treatments are being planned under the direction of the Klamath Falls Resource Management Plan Record of Decision (1995) and the Jenny Creek Watershed Assessment and Analysis (1994).

The proposed action is to thin small diameter (less than 10 to 12 inches) understory trees from around ponderosa pine, sugar pine, white pine, and Douglas fir in the outer portion of Riparian Reserves in the Jenny Creek watershed. Treatments could occur within District Designated Reserves (DDR) and DDR Buffers, provided that the proposed action is consistent with management recommendations described in Late Successional Reserve Assessments. The overall objective is to maintain and restore the diversity of forest stands near streams in a way that emulates natural "patchiness" of low intensity fire and other disturbance events. Stem densities would be reduced to meet the objectives of maintaining and restoring forest stands to provide long-term sources of shade and large woody debris. Additionally, in areas with excessive accumulations of down wood, small diameter material would be piled and burned.

The issues addressed in the EA concern potential impacts to fish habitat, water quality, and other resources as they affect aquatic life and humans in the proposed project area. The design features of the Proposed Action and alternatives are described in the attached Johnson/Sheepy Riparian Reserve Vegetation Treatment EA.

Determination:

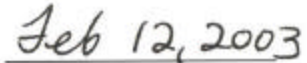
The anticipated environmental effects contained in this EA are based on research, professional judgement, and experience of the Interdisciplinary (ID) team and Klamath Falls Resource Area staff. Based on the information within the Environmental Assessment, it is my determination that none of the alternatives analyzed constitute a significant impact affecting the quality of the human environment greater than those addressed in the:

- Klamath Falls Resource Area Resource Management Plan and Final Environmental Impact Statement (RMP/FEIS, September 1994) and its Record of Decision (ROD, June 1995)
- Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (April 1994), also known as the Northwest Forest Plan (NFP).
- Klamath Falls Resource Area Fire Management EA#OR-014-94-09 (1994).
- Klamath Falls Resource Area Integrated Weed Control Plan EA (1993).
- Final Environmental Impact Statement, Vegetation Treatments on BLM Lands in Thirteen Western States (1991).
- Interior Columbia Basin Ecosystem Management Project and the Eastside Draft Environmental Impact Statement (ICBEMP, May 1997).

Therefore, an Environmental Impact Statement, or a supplement to the existing RMP or Environmental Impact Statement, is not necessary and will not be prepared.



Teresa A. Raml
Field Manager, Klamath Falls Resource Area



Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKEVIEW DISTRICT
EA COVERSHEET

RESOURCE AREA: Klamath Falls

FY& EA #: OR-014-02-04

ACTION/TITLE: Johnson/Sheepy Riparian Reserve Vegetation Treatments

LOCATION: Klamath Falls Resource Area

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FREEDOM OF INFORMATION ACT AND RESPONDENT'S PERSONAL PRIVACY INTERESTS: The Bureau of Land Management is soliciting comments on this Environmental Assessment. Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Environmental Assessment No. OR-014-02-04

for

**Johnson/Sheepy Riparian Reserve
Vegetation Treatments**

Klamath Falls Resource Area – Lakeview District
Klamath Falls, Oregon

Johnson/Sheepy Riparian Reserve Vegetation Treatments
EA No. OR-014-02-04

1.0 INTRODUCTION.....	3
<i>1.1 Purpose of Proposed Action</i>	<i>3</i>
<i>1.2 Need for Proposed Action.....</i>	<i>3</i>
<i>1.3 Location</i>	<i>4</i>
<i>1.4 Conformance With Land Use Plans.....</i>	<i>4</i>
2.0 ALTERNATIVES	5
<i>2.1 Alternative 1 (Proposed Action)</i>	<i>5</i>
<i>2.2 Alternative 2.....</i>	<i>8</i>
<i>2.3 Alternative 3 (No Action).....</i>	<i>9</i>
<i>2.4 Alternative 4 (Dropped from Consideration)</i>	<i>9</i>
<i>2.5 Alternative 5 (Dropped from Consideration)</i>	<i>9</i>
3.0 AFFECTED ENVIRONMENT	9
<i>3.1 Aquatic Conservation Strategy Components.....</i>	<i>9</i>
<i>3.2 Hydrology.....</i>	<i>10</i>
<i>3.3 Soils</i>	<i>11</i>
<i>3.4 Vegetation</i>	<i>12</i>
<i>3.5 Wildlife Habitat (including Survey and Manage wildlife species)</i>	<i>13</i>
<i>3.6 Aquatic Habitat</i>	<i>19</i>
<i>3.7 Survey and Manage Species.....</i>	<i>20</i>
<i>3.8 Botany</i>	<i>22</i>
<i>3.9 Noxious Weeds</i>	<i>22</i>
<i>3.10 Livestock Grazing</i>	<i>23</i>
<i>3.11 Wild Horses.....</i>	<i>23</i>
<i>3.12 Cultural Resources.....</i>	<i>23</i>
<i>3.13 Fire and Fuels Management</i>	<i>24</i>
<i>3.14 Air Quality.....</i>	<i>25</i>

3.15 Recreation	25
3.16 Visual Resources.....	25
4.0 ENVIRONMENTAL IMPACTS	26
4.1 ACS Components	26
4.2 Hydrology.....	27
4.3 Soils	28
4.4 Vegetation	29
4.5 Wildlife Habitat.....	29
4.6 Aquatic Habitat	33
4.7 Survey and Manage Species.....	35
4.8 Botany	35
4.9 Noxious Weeds	36
4.10 Livestock Grazing	36
4.11 Wild Horses.....	36
4.12 Cultural Resources.....	36
4.13 Fire and Fuels Management	37
4.14 Air Quality.....	37
4.15 Recreation	38
4.16 Visual Resources.....	38
5.0 PROJECT DESIGN FEATURES	39
6.0 REFERENCES	42
7.0 MAPS AND PHOTOS	44

1.0 INTRODUCTION

1.1 Purpose of Proposed Action

The proposed action is to thin understory trees from around ponderosa pine, sugar pine, white pine, and Douglas fir in the outer portion of Riparian Reserves in the Jenny Creek watershed. The overall objective is to maintain and restore the diversity of forest stands near streams in a way that emulates natural “patchiness” of disturbance events. Stem densities would be reduced to meet the objectives of maintaining and restoring forest stands to provide long-term sources of shade and large woody debris. Additionally, in areas with excessive accumulations of down wood, small diameter material would be piled and burned.

This EA will assist in the decision making process by assessing the environmental consequences resulting from implementing the proposed action. If the proposed action is implemented, thinning within Riparian Reserves would occur in stages over multiple years and separate Decision Records would be prepared for each stage.

1.2 Need for Proposed Action

The composition of forested stands in the mixed-conifer and true fir vegetation zones has been affected by fire suppression and past timber harvest. These actions have contributed to the increased relative abundance of white fir, reduced the occurrence of various pine species and Douglas fir, and increased the volume of down wood that could fuel stand-replacing wildfires. Remaining old-growth pines and Douglas firs are susceptible to competition from increased densities of understory white fir (BLM 1994, page 33). Within Riparian Reserves, old-growth trees provide shade, a source of coarse woody debris, and habitat for terrestrial species (Maser et al. 1988).

Douglas fir and various pine species, though long-lived, do not represent climax vegetation communities in the mixed-conifer and true fir vegetation zones. Rather, these species reproduce in open patches resulting from fire or other types of disturbance (Franklin and Dyrness 1969). Given that:

- (1) Historic fire return intervals in Riparian Reserves may not have differed significantly from return intervals in upland areas (Olson, 2000);
- (2) The frequency of low-intensity fires (which would have consumed primarily the understory white fir and maintained fairly open stand structures) has been reduced (BLM 1994, page 29); and,
- (3) That past timber harvest removed a large component of the mature pines and Douglas firs from within Riparian Reserves,

it is evident that the ecological processes that affect the composition of forested stands within Riparian Reserves have been altered.

Timber sales that have occurred in the headwaters of Jenny Creek since the implementation of the Northwest Forest Plan have mostly avoided entering and thinning trees within Riparian Reserves, except in the outer portion of some Riparian Reserves (e.g., Frosty Forest Health Treatments EA, BLM 1995). While the ecological functions of Riparian Reserves are unique and valuable, vegetation communities and soils within portions of Riparian Reserves (especially on mid- and upper-slope positions) are often similar to those that occur on adjacent areas (“matrix”) that are not within Riparian Reserves. Stand dynamics that occur in these portions of Riparian Reserves are similar to those occurring in other forested matrix areas (i.e., white fir is susceptible to drought, excessive fuel loads can accumulate, etc.).

The Proposed Action alternative of the Frosty Forest Health Treatments EA included vegetation treatments (understory thinning) designed to meet forest health objectives within the outer portion of some Riparian Reserves. The BLM interdisciplinary team that was responsible for developing the Frosty EA determined that mechanical equipment could be utilized to implement these projects, which were proposed as part of any timber sale that would take place in the area covered by the EA. Because of concerns regarding the level of ground disturbance that would result from mechanical harvesting within the “inner gorge” of Riparian Reserves, a “no cut zone” was established in the inner portion of Riparian Reserves. Since the completion of the Frosty EA, the use of hand crews to manually fall and pile small diameter trees has become a much more commonly used land management tool. The use of such crews reduces the impacts of ground disturbance.

Jenny Creek is a Tier 1 key watershed. As such, treatments to restore large conifers and fire regimes in Riparian Reserves are a priority (NFP ROD pages B-19 and B-31; KFRA RMP page 14). These treatments would be designed to address three of the nine ACS objectives (Water Quality, Plant Communities, and Habitat).

1.3 Location

The proposed action would occur on lands within the Jenny Creek watershed that are administered by the Klamath Falls Resource Area (Map 1). Riparian Reserves occur adjacent to the mainstems and tributaries of Johnson Creek, Cold Creek, and Sheepy Creek. Riparian Reserves within the analysis area affected by the Upper Spencer Creek EA (along the southwest flank of Surveyor Mountain, to the north of the 38-5E-28.1, 38-5E-26, and 38-6E-32 roads) and within the Old Baldy Research Natural Area would be excluded from the proposed action. Treatments could occur within District Designated Reserves (DDRs) and DDR Buffers, provided that the proposed action is consistent with management recommendations described in Late Successional Reserve Assessments (these assessments currently await approval by the Regional Ecosystem Office).

The legal descriptions of potential treatments units are as follows (see Map 2):

T 38 S – R 5 E – sections 17, 19, 20, 21, 27, 28, 29, 30, 31, and 35
T 39 S – R 5 E – sections 1, 3, 11, 12, 13, 17, 21, and 29
T 39 S – R 6 E – section 7

If adjacent private landowners are willing to conduct understory thinning adjacent to streams to meet forest health and riparian objectives that would benefit BLM management objectives, the BLM would consider implementing cooperative projects (consistent with Oregon Department of Forestry administrative rules regarding riparian management areas).

1.4 Conformance With Land Use Plans

The proposed treatments are in conformance with the following Plans and Environmental Review Documents:

- Klamath Falls Resource Area Record of Decision and Resource Management Plan (KFRA ROD/RMP) (June 1995).
- Final Klamath Falls Resource Area Management Plan and EIS (KFRA FEIS) (September 1994).

- Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (April 1994), also known as the Northwest Forest Plan (NFP).
- Final Supplemental Environmental Impact Statement on Management Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of Northern Spotted Owl (FSEIS) (Feb. 1994).
- Klamath Falls Resource Area Fire Management EA#OR-014-94-09 (June 1994).
- Klamath Falls Resource Area Integrated Weed Control Plan EA (July 1993).
- Interior Columbia Basin Ecosystem Management Project (ICBEMP) (December 2000).

2.0 ALTERNATIVES

2.1 Alternative 1 (Proposed Action)

Thinning would occur in older stands with dense understories as well as in young stands (such as plantations). Thinning would be done by hand crews using chainsaws to limit the amount of disturbance to the soils, vegetation, and wildlife habitat within the Riparian Reserves.

In older stands, dense understory patches dominated by white fir would be thinned in a manner that emulates the effects of low-intensity fire on stand structure and composition. Removal of small trees from around existing large (20"+ dbh) pines would also be done, as would release cutting of competing trees around smaller individual pines. In general, thinning would focus on removing white fir less than 10 to 12 inches dbh (see Photos 1 and 2 at the end of this document).

In younger, more even-aged stands, conifers up to 6" dbh would be treated by hand-felling and piling. Conifers would be thinned to an approximate spacing of 16' X 16' (the spacing may be adjusted to fit specific site conditions). Sugar pine, ponderosa pine, and Douglas fir would generally be favored.

The first units that would be treated occur adjacent to Johnson Creek and the West Fork of Johnson Creek (T38S-R5E-sections 28 and 29). Additional units would be identified for treatments to occur within the next five years.

The maximum total area of treatments that would occur on BLM-administered land under this alternative is 800 acres. Treatments would be implemented over a period of years, with approximately 100 to 200 acres treated per year.

Thinning Prescription

Units within Riparian Reserves would be divided into three zones: a no cut zone along the stream, an understory thinning zone in the outer portion of the riparian reserve, and a "feathered" transition zone between the no cut area and the understory thinning area (see Figure 1).

No Cut Area

In order to protect stream shading in the short-term and to limit damage to riparian soils and plant communities, no cutting, slash-piling, or disturbance will be allowed within 40 feet slope distance of each side of perennial or fish-bearing streams (80 foot total no-cut buffer along the stream) or within 20 feet of each side of intermittent streams (40 foot total no-cut buffer). These buffers would be implemented only for treatments within older stands (with large trees that currently provide substantial shade). No-cut buffers would not be established within plantation-like units, although no slash-piling would be allowed within 40 feet slope distance of each side of perennial or fish-bearing streams or within 20 feet of each side of intermittent streams.

Understory Thinning Zone

- Approximately 170 leave trees per acre conforming to an average 16-foot understory spacing shall be identified. The average spacing will be reduced in stands dominated by small diameter trees. The largest, healthiest, best-formed leave trees shall be selected in the following species priority: 1) sugar pine, ponderosa pine, and white pine, 2) Douglas-fir, 3) Shasta red fir, 4) incense cedar, 5) white fir. Within these areas, remove conifers with diameter less than 10" DBH and height greater than one foot.

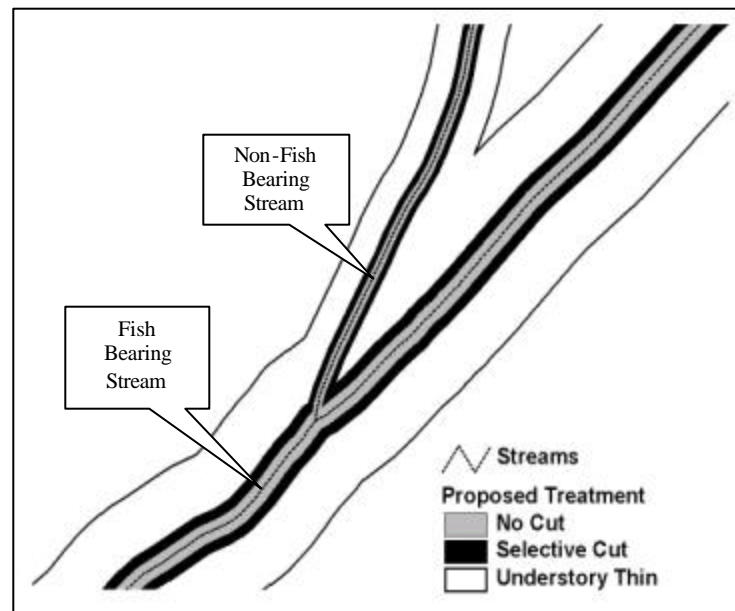


Figure 1. General layout of proposed treatment zones within Riparian Reserves.

- Clear “donut cuts” under larger (20"+ dbh) pines that are in good condition to 10 feet out from the dripline or a 25-foot radius from the tree, whichever is greater. Within these areas, conifers with dbh less than 12" would be cut.
- In areas with few small pines (< 10" dbh), clear white fir within a 25-foot radius of small pines that are in good condition. Within these areas, remove conifers with diameter less than 12" dbh and height

greater than one foot.

Transition Zone

- Clear “donut cuts” under larger (20"+ dbh) pines that are in good condition to 10 feet out from the dripline or a 25-foot radius from the tree, whichever is greater.
- In areas with few small pines (< 10" dbh), clear white fir within a 25-foot radius of small pines that are in good condition. Within these areas, remove conifers with diameter less than 12" DBH and height greater than one foot.

Within both the understory thinning zone and the transition zone, the following would apply:

- Within both “donut cuts” and 25-foot radius cuts around small pines, at least one leave tree in good condition would be left within the cleared area, and would be chosen based on species preference (described above) and location (trees that are less likely to function as ladder fuels would be retained).
- No Pacific yew or riparian deciduous trees would be cut.
- Up to three mixed-conifer patches per mile of stream will be marked as “no-cut” to provide thermal refugia habitat.
- Areas around Survey and Manage mollusk and fungi sites will be buffered or managed to benefit habitat conditions for the species present.
- Additional individual leave trees may also be identified for habitat purposes. No snags would be cut, unless needed to address large scale fuels and forest health issues and meet ACS objectives.
- In extensive areas with excessive fuel loading, accumulations of small diameter (< 10" DBH) down woody debris occurring outside of the no-cut area (but within treatment units) could be piled and burned or removed, with the concurrence of the KFRA Riparian Team. Additionally, prescribed fire could be “backed down” into Riparian Reserves to reduce fuel loads.

Removal of Cut Material

After thinning, the majority of cut material would be either (1) bucked and lopped into smaller pieces and piled in openings within the treatment area for burning at a later time, or (2) yarded from the treatment unit using low-impact techniques (such as small cable yarders, horses, etc.). If cut trees are to be yarded, they will be directionally felled away from stream channels. No new roads or landings would be constructed in Riparian Reserves (KFRA RMP/ROD pages F-14 and F-23 to -24).

In areas adjacent to streams with relatively low volumes of in-stream large woody debris, some trees could be either (1) directionally felled towards the stream channel, or (2) pulled into the stream using cable yarding equipment in such a way that the root wad remains attached to the tree. Such trees would be left in place in order to reduce soil disturbance that could occur were the trees repositioned.

When piling/burning is the preferred prescription, all cut material would be lopped and/or bucked into 48" or shorter pieces and piled in openings within the treatment area. Following the thinning, the piled material would be burned in the late fall or early winter during a low wildfire risk period. No piles would

be located within the no-cut buffers or within areas that currently exhibit riparian vegetation communities.

Planting

Planting of desired conifer or deciduous species in some of the existing openings (including decommissioned roads and landings) or in treatment areas could be done during subsequent planting seasons.

Monitoring

Monitoring is an important component of restoration projects and would occur in selected treatment units. The objectives of the monitoring program would be to: (1) determine if Best Management Practices have been implemented; (2) determine the effectiveness of management practices; and (3) validate whether ecosystem functions and processes have been maintained as predicted.

2.2 Alternative 2

Under this alternative, thinning within Riparian Reserves would occur only in stands consisting primarily of one or two relatively young age classes. Such stands include plantations and areas recovering from past catastrophic fire, logging, or other stand-replacing disturbances. Thinning would not occur in older stands that contain substantial overstories of older pine and Douglas fir mixed with understories dominated by white fir.

The maximum total area of treatments that would occur on BLM-administered land under this alternative is 500 acres. Treatments would be implemented over a period of years, with approximately 100 to 200 acres treated per year.

Conifers up to 6" dbh would be treated by hand-felling and piling. Conifers would be thinned to an approximate spacing of 16' X 16' (the spacing may be adjusted to fit specific site conditions). Sugar pine, ponderosa pine, and Douglas fir would generally be favored. No cutting or removal of larger diameter trees would occur unless analyzed in a future site-specific environmental analysis.

No-cut buffers would not be established adjacent to intermittent, perennial, or fish-bearing streams under this alternative. To protect soil resources and stream banks, no slash-piling would be allowed within 40 feet slope distance of each side of perennial or fish-bearing streams or within 20 feet of each side of intermittent streams.

Within treatment units, the following would apply:

- No Pacific yew or riparian deciduous trees would be cut.
- Up to three mixed-conifer thickets per mile of stream will be marked as "no-cut" to provide thermal refugia habitat.
- Areas around Survey and Manage mollusk and fungi sites will be buffered or managed to benefit habitat conditions for the species present.
- Additional individual leave trees may also be identified for habitat purposes. No snags will be cut, unless needed to address fuels and forest health issues and meet ACS objectives.

- In extensive areas with excessive fuel loading, accumulations of small diameter (< 10" DBH) down woody debris occurring within treatment units could be piled and burned or removed in order to reduce the lateral continuity of fuels (with the concurrence of the KFRA Riparian Team). Additionally, prescribed fire could be "backed down" into Riparian Reserves to reduce fuel loads.

2.3 Alternative 3 (No Action)

Under the No Action alternative, no manual treatments of forest stands within Riparian Reserves in the Johnson Creek and Sheepy Creek subwatersheds would be implemented as part of the proposed project being analyzed in this document.

2.4 Alternative 4 (Dropped from Consideration)

Alternative 4 would be the use of only prescribed fire to reduce the density of the shade-tolerant patches and individual trees, mainly white fir.

This alternative was dropped from consideration because some of the stands need to be thinned prior to underburning because of the ladder arrangement of fuels and density of stands. Underburning without some type of pre-treatment and removal of fuels could result in excessive and unacceptable mortality to desired tree species and potentially significant impacts to other resources including soils, riparian habitat, wildlife, and fisheries habitat.

2.5 Alternative 5 (Dropped from Consideration)

Alternative 5 would be the use of treatments with mechanical equipment to enable removal of larger diameter trees than is possible under Alternative 1.

This alternative was dropped from consideration due to the level of analysis required and the current lack of site-specific information regarding the effects on water quality and habitat of thinning larger trees within Riparian Reserves. Effects of such projects may be generally similar to those resulting from Alternatives 1 although the risk of detrimental impacts is higher (due to the removal of larger trees and the use of mechanical yarding equipment). While there would be added benefit to pines as a result of cutting medium-sized (>12" DBH) adjacent white fir, additional benefit to riparian resources may be limited. Future treatments to cut and remove larger white fir from Riparian Reserves may be appropriate, depending on management objectives.

3.0 AFFECTED ENVIRONMENT

The area encompassing potential treatment units is shown on Map 2. The extent of proposed treatments varies by alternative.

A description of vegetation communities, associated ecological processes, and natural resource values can be found in the Jenny Creek watershed analysis (BLM 1994). Additional information can be found in the Frosty Timber Sale EA (BLM 1995) and in the Final KFRA RMP/EIS (pages 3-63 to 3-66).

3.1 Aquatic Conservation Strategy Components

The Aquatic Conservation Strategy (ACS) is an element of the Northwest Forest Plan Record of Decision

(1994), and includes the following components: Riparian Reserves, key watersheds, watershed analysis, and watershed restoration. These four components are designed to meet nine ACS objectives (see the Northwest Forest Plan ROD for more information).

Riparian Reserves are designated adjacent to streams and include areas that are required to maintain the hydrologic, geomorphic, and ecologic process that directly affect fish habitat and standing and flowing water. Riparian Reserves apply only to federal lands. Approximately 1,440 acres of Riparian Reserves occur on BLM-administered lands in the analysis area. If private landowners are willing to cooperate with the BLM, treatments could also occur within “riparian management areas” on private land.

Key watersheds serve as the cornerstones of aquatic species recovery, and special guidelines apply to federal lands within key watersheds. Jenny Creek is a Tier 1 key watershed that contributes to the conservation of special status fish and salmonid species and has a high potential of being restored as part of a watershed restoration program. The watershed encompasses about 134,000 acres, about 12,000 of which are administered by the KFRA. A high natural waterfall and human-caused barriers along Jenny Creek limit aquatic connectivity of the watershed with the Klamath River.

Watershed analysis is required in key watersheds and Riparian Reserves prior to determining how proposed land management activities meet ACS objectives. The Jenny Creek watershed analysis was completed in 1994.

Watershed restoration will be an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. The most important components of watershed restoration are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity. Monitoring is an important component of restoration projects.

3.2 Hydrology

Streamflow

The entire analysis area is tributary to Jenny Creek, which flows into the Klamath River at Iron Gate Reservoir.

Numerous streams in the analysis area flow intermittently or perennially, and ephemeral streams commonly occur in draws. Springs provide year-round flow to portions of Johnson Creek, Cold Creek, and Sheepy Creek. Wet meadows occur near these springs and elsewhere, including extensive areas along the lower portion of Sheepy Creek and in Johnson Prairie. Most of the length of perennial streams in the analysis area occurs on private land downstream from BLM-administered land.

Baseflows and peak flows in the analysis area have likely been affected by timber harvest, road construction, and fire suppression. Timber harvest and road construction can lead to increased peak flows. Timber harvest reduces the use of water through transpiration, and therefore may lead to increased water availability for streamflow. Fire suppression leads to increased stem densities and water use through transpiration, thereby reducing water available for streamflow.

Water Quality

Johnson Creek (from its mouth to headwaters) is included on the 1998 Oregon DEQ 303(d) list of water quality impaired streams for exceedance of the 64°F temperature standard for salmonid rearing. The

headwaters of Johnson Creek (including the portion within the analysis area, Cold Creek, Onion Springs, and Sheepy Creek) provide cold water to lower portions of the stream (see Table 1 and Figure 2). Temperatures in the stream reaches immediately downstream from the springs are stable as a result of steady groundwater inputs.

Table 1. Instantaneous water temperature measurements in the analysis area (unpublished BLM data).

Stream Name (Elevation in feet)	Number of Samples	Range of Temperatures (°F)
Johnson Creek (5040)	5	42 - 53
Cold Creek (4950)	7	46 - 49
Onion Spring (5300)	1	49

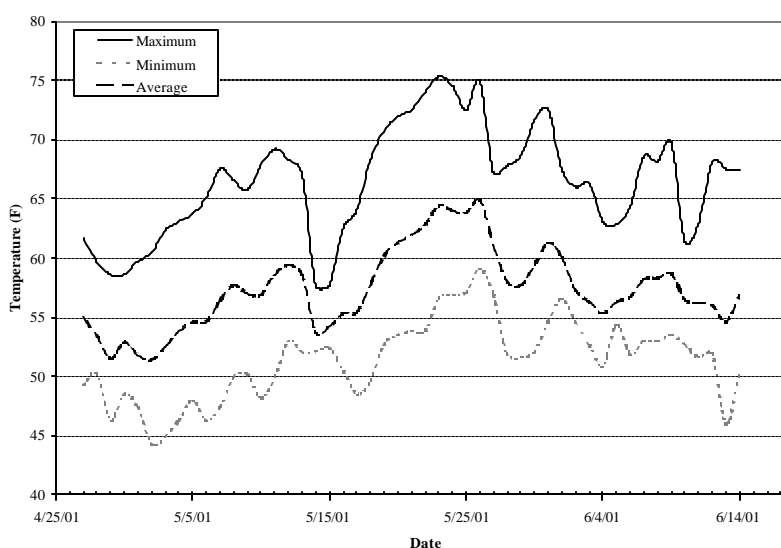


Figure 2. Daily water temperatures in Johnson Creek, approximately one mile downstream from the analysis area boundary (Medford BLM field data).

Degraded water quality in the downstream portion of Johnson Creek within the analysis area is likely a result of grazing, timber harvest, and road construction. In addition to the direct effects of reduced shading and increased sediment delivery, indirect effects (such as bank erosion and channel widening) also affect water quality. Water quality conditions also reflect natural conditions, such as clay rich soils, low streamflows, and southerly aspects.

Proper Functioning Condition (PFC) surveys of Johnson Prairie, Cold Creek, Sheepy Creek, and Onion Springs were conducted in 1997 and indicate that these streams are in proper functioning condition.

3.3 Soils

Soils on hillslopes adjacent to headwater streams and streams occupying confined valleys within the analysis area are comprised primarily of the Oatman series and Woodcock-Pokegama complex. These deep, well drained soils form in colluvium derived from andesite (composite between basalt and rhyolite)

and volcanic ash. Permeability is moderate, and the potential for runoff and erosion is moderate to high. These soils are susceptible to compaction by mechanical equipment during wet periods. (USDA SCS 1993).

Soils within and adjacent to watercourses occupying relatively unconfined valleys within the analysis area are primarily comprised of the Klamath series soil type. These soils are very deep, poorly drained soils on flood plains. They formed in alluvium derived dominantly from volcanic ash, andesite, and basalt. Permeability is slow for this soil series. Due to gentle slopes, runoff is slow, and the hazard of water erosion is slight. These soils are frequently flooded for long periods in the spring. These soils are susceptible to compaction of the surface layer by livestock and wildlife during seasonal wetness. It is likely that compaction would occur to greater depths if ground-based mechanical treatments were implemented during seasonal wet periods (USDA SCS, 1993).

3.4 Vegetation

Forest communities in the Riparian Reserves managed by the KFRA occur within the Mixed Conifer and White Fir zones. Within Riparian Reserves, these forests provide shade, nutrients, and large woody debris to stream channels, as well as habitat for various big game, bird, and amphibian species.

In the Frosty Forest Health Treatments EA (BLM 1995), forested stands within matrix lands were described as being affected by “...a decline in forest health (stand resiliency) and an increased fire hazard in some forested areas. Forest health in this EA is defined as the resiliency of the residual stands to sustain themselves in the process of natural disturbances such as insect outbreaks and wildfire.” Fire suppression and past commercial timber harvest have altered the relative proportion of different tree species and the density of forested stands within Riparian Reserves in the Jenny Creek watershed (BLM 1994, pages 17 to 33). Analysis of Forest Operations Inventory records using a GIS indicates that approximately 475 acres within BLM-administered Riparian Reserves in the analysis area have been affected by previous logging activities that focused on removing overstory trees (Table 2).

Table 2. Extent of overstory timber harvests within BLM-administered Riparian Reserves in the analysis area.

Timber Harvest Method	Acres Affected
Clearcut	74
Shelterwood Cut	97
Overstory Removal	306
Total	477

Stand exam data from three Riparian Reserves within the analysis area provides insight into the composition of forest stands within potential treatment units. The three measured stands are currently managed for old-growth values, but have been entered previously for commercial timber harvest and have been affected by landscape-scale fire suppression. They have very large numbers of small diameter trees per acre (Figure 3) and are dominated by white fir (Figure 4). Within the eastern Cascades, stands with significant white fir components are susceptible to drought, insects, and disease and are prone to mass mortality (Cochran, 1998).

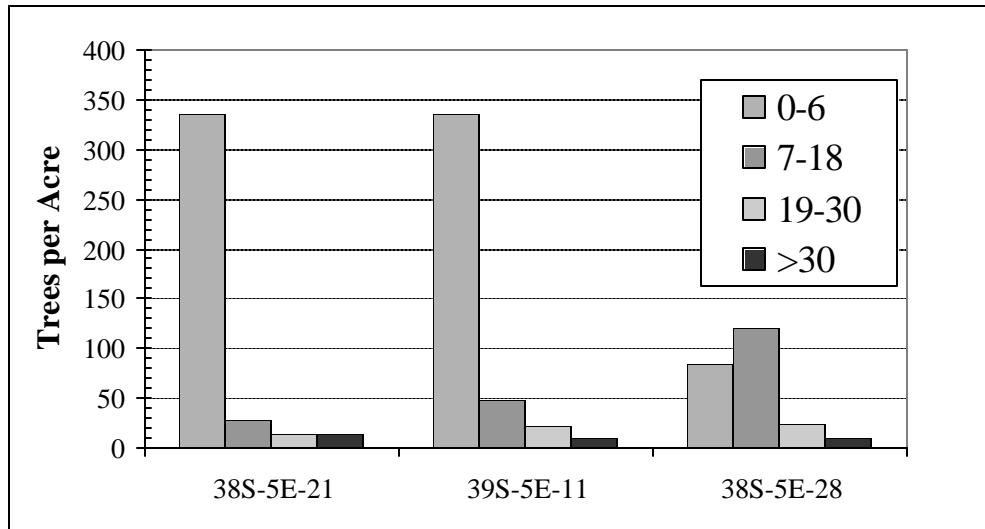


Figure 3. Trees per acre, by diameter class (dbh, in inches), for three forested stands (identified by legal location) within Riparian Reserves (BLM data).

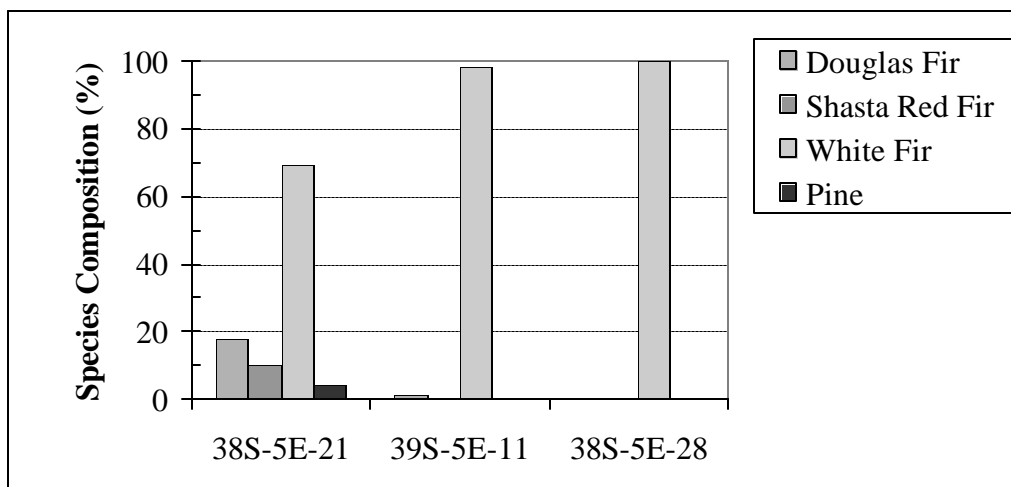


Figure 4. Species composition for three forested stands (identified by legal location) within Riparian Reserves (BLM data).

True riparian vegetation occurs discontinuously along watercourses and adjacent to springs, seeps, wetlands, and constructed and natural ponds. Plant species include willow, alder, dogwood, and various sedge, rush, and other herbaceous species. Pacific yew occurs in isolated locations within the analysis area.

3.5 Wildlife Habitat (including Survey and Manage wildlife species)

For a list of common species in the proposed project area, refer to the KFRA RMP/ROD, Appendix 3C. A description of their habitats is located in the Jenny Creek Watershed Assessment and Analysis (pages 43-52) and the Klamath Falls Resource Area FEIS (pages 3-37 to 3-41).

Special Status Species - Wildlife

Bald Eagle (*Haliaeetus leucocephalus*)

Under the Endangered Species Act, the USFWS lists the bald eagle as Threatened in Oregon. The analysis area falls within the Klamath Basin Recovery Zone under the Pacific Bald Eagle Recovery Plan. Within the project area, recovery has exceeded goals due partly to the establishment of the Bear Valley National Wildlife Refuge in the late 1970s and implementation of protective measures by private, state, and federal land managers.

There are currently no known bald eagle breeding territories on BLM-administered land in or adjacent to the proposed units. If treatment units are located near bald eagle habitat, a BLM wildlife biologist will initiate the “streamlined consultation” process and implement appropriate Project Design Features.

Northern Spotted Owl (*Strix occidentalis caurina*)

Within the analysis area, there are currently five known spotted owl sites (as of 2002, two active and three historic) within designated Nesting, Roosting and Foraging (NRF) critical habitat for the spotted owl and/or within District Designated Reserves (Owl Core Areas). Some of the area may also serve as dispersal habitat. If treatment units are located within spotted owl NRF habitat or Owl Core Areas, a BLM wildlife biologist will initiate the “streamlined consultation” process and implement appropriate Project Design Features.

Canada Lynx (*Lynx canadensis*)

In 1999, a lynx habitat analysis was conducted using interagency guidelines, as recommended by the Lynx Science Team, to determine if lynx habitat existed within the Lakeview District, including the analysis area. Following the criteria for identifying and mapping suitable lynx habitat, it was determined that no lynx habitat exists within the Lakeview District. Because of this, the potential impacts to the Canada lynx from this action will not be analyzed further in this document and consultation with the USFWS will not be initiated.

Other Species of Concern

Northern Goshawk (*Accipiter gentilis*)

The northern goshawk is considered a bureau sensitive species by the BLM. There are currently five known sites within the analysis area. The goshawk is generally associated with mature conifer stands and uses habitat similar to that of the northern spotted owl.

Survey and Manage Avian Species

Great Gray Owl (*Strix nebulosa*)

The great gray owl is considered rare or uncommon in Oregon, and is currently considered a Survey and Manage species (formerly a protection buffer species) under the Northwest Forest Plan. As such, surveys are required prior to any ground disturbing activities. Surveys for great gray owls have been conducted within the proposed project area. Detections at two locations have resulted in these areas being considered single territories, although no nest site has been located. Recently, twenty great gray owl

nesting platforms were erected in the Johnson Prairie area on private land near or adjacent to BLM land (specifically, 39S-5E-17, 21, and 29).

Great gray owls forage in openings in forest stands or in meadow habitat adjacent to the forest edge, and generally use large broken top trees, as well as large platform nests (such as those constructed by red-tailed hawks, goshawk, ravens, etc.) for nesting structure.

White-headed (*Picoides albolarvatus*) and Black-Backed Woodpecker (*Picoides arcticus*)

The white-headed woodpecker is generally associated with mature, open-canopied ponderosa pine stands and, to a lesser degree, mixed conifer forests. They usually select snags as nest trees and forage on large ponderosa pine trees. Although they are not common within the analysis area, they have been documented in the KFRA. The black-backed woodpecker is generally associated with lodgepole and ponderosa pine dominated stands that may be mixed with other conifers. Although they are not common, they potentially occur in the analysis area.

Flammulated Owl

The flammulated owl is closely associated with open forests that have a ponderosa pine component, apparently due to the lepidopteran (moths and/or butterflies) prey species that are associated with this type of forest. No surveys have been conducted for this species within the planning area. Systematic surveys have been conducted for the northern spotted owl and great gray owl within the analysis area and no incidental detections of the flammulated owl have occurred.

Other Terrestrial Wildlife Species

Ungulates

The analysis area contains summer and transitional range (spring and summer) for Columbian black-tailed deer (*Odocoileus hemionus columbianus*). The area also supports a small population of year-round residents. Approximately 2,500 deer are estimated to use this area as summer range, which is a lower population than trends projected by ODFW. Population goals are set at 3,200 animals by ODFW for the Keno Unit, the management unit that includes the analysis area.

Roosevelt elk (*Cervus elaphus*) use this area year-round, with much higher concentrations during the summer months. Elk populations have expanded in the area since the animals were first noted 20 years ago. Elk probably moved into the area partially in response to favorable forage to cover ratios that resulted from past and current logging practices.

Furbearers

The bobcat (*Lynx rufus*), mountain lion (*Felis concolor*), and black bear (*Ursus americana*) and the American marten (*Martes americana*) are known to occur in the area. The fisher (*Martes pennanti*) has not been documented within the analysis area.

Bats

Several bat species may be found within the analysis area (refer to a complete list on page 67 of the TPLA). Several of these are considered sensitive. Table 3 lists the special status bat species that may occur within the proposed units.

Table 3. Current state and federal status for bats known to occur in the analysis area (Information compiled from the Oregon Natural Heritage Program Database, March 2001)

Species	State Status	Federal Status
Silver-haired bat	SU	-
Long-eared bat	SU	SC
Long-legged myotis	SU	SC
Fringed bat	SV	SC
Yuma bat	-	SC
Pacific pallid bat	SV	-
SV=Sensitive, vulnerable SU=Sensitive, Unknown Status SC = Species of Concern (Former Federal Candidate C2)		

Upland Birds

California quail (*Callipepla californicus*), mountain quail (*Oreortyx pictus*), ruffed grouse (*Bonasa umbellus*), blue grouse (*Dendragapus obscurus*), and wild turkeys (*Meleagris gallopavo*), are found within the analysis area. The California and mountain quail are both dependent on brushy areas with grassy openings that are often associated with or near riparian areas. The blue grouse is considered fairly common in the analysis area and is generally associated with mixed conifer forests, whereas the ruffed grouse is considered less common and is associated with riparian areas. The introduced wild turkey has a small but stable population, although the ODFW has temporarily halted releases in the analysis area.

Raptors

Several raptors (birds of prey) that are not considered special status species migrate through, and may nest within, the analysis area.

Hawk species include the red-tailed (*Buteo jamaicensis*), Cooper's (*Accipiter cooperii*) and sharp-shinned hawk (*Accipiter striatus*). The Cooper's and sharp-shinned hawk are closely associated with coniferous forest but use riparian areas readily for hunting. There are currently six known Cooper's hawk sites and no known sharp-shinned hawk sites in or near the proposed site. All of the above species primarily forage

on birds and small mammals. The northern goshawk (*Accipiter gentilis*) is discussed under special status species.

Owl species that may occur in the proposed project area include the great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), northern pygmy owl (*Glaucidium gnoma*), northern saw-whet owl (*Aegolius acadicus*) and western screech owl (*Otus kennicottii*). The northern spotted owl (*Strix occidentalis caurina*), flammulated owl (*Otus flammeolus*) and great gray owl (*Strix nebulosa*) are discussed under special status species.

Woodpeckers

Several species, including the white-headed (*Picoides albolarvatus*), pileated (*Dryocopus pileatus*), hairy (*Picoides villosus*), downy (*Picoides pubescens*), Williamson's sapsucker (*Sphyrapicus thyroideus*) red-breasted sapsucker (*Sphyrapicus ruber*), and northern flicker (*Colaptes auratus*) are known to occur in the area. The pygmy nuthatch is also highly associated with ponderosa pine forests. These species all rely heavily on snags of varying sizes and age classes for foraging and nesting habitat.

Landbirds

Surveys for landbirds (primarily passerines) within the Topsy Pokegama Landscape Analysis area were conducted between 1998 and 2001. Although these surveys did not include the analysis area, they provide insight regarding use of similar habitats within potential treatment units. The habitat types that would be most directly affected by the proposed project include shrub habitats and the sapling/pole stages of forest habitats. Landbird species generally associated with these habitat types (based on Andelman and Stock 1994, and Saab and Rich 1997) that have been documented in Topsy-Pokegama area are listed in Table 4. Other species associated with seedling/shrub and sapling/pole stages of coniferous forest that could occur in the area, but have not been documented, include the common nighthawk, Calliope hummingbird, gray flycatcher, Western bluebird, and mountain bluebird.

Table 4. Landbirds associated with seedling/shrub and sapling/pole habitats that have been documented in the project area and their population trend (Partners in Flight Handbook on Species Assessment & Prioritization, Panjabi, 2001).

Landbird Species	Population Trend	Seedling/Shrub Association	Sapling/Pole Association
American robin	Stable	X	X
Cassin's finch	Stable		X
Cassin's vireo	Uncertain		X
Chipping sparrow	Significant Decline		X
Dark-eyed junco	Moderate Decline	X	X
Dusky flycatcher	Uncertain	X	
Fox sparrow	Moderate Decline	X	
Green-tailed towhee	Stable	X	
Hermit thrush	Uncertain		X
House wren	Possible Increase	X	X
Nashville warbler	Possible Increase	X	
MacGillivray's warbler	Moderate Decline	X	X
Mourning dove	Moderate Decline		X
Olive-sided flycatcher	Significant Decline		X

Pine siskin	Significant Decline	X	X
Spotted towhee	Significant Increase	X	
Townsend's solitaire	Significant Increase	X	X
Western tanager	Uncertain		X
Western wood-pewee	Uncertain		X
Yellow-rumped warbler	Stable		X

Herptiles

There have been no formal reptile and amphibian inventories done within the proposed treatment units. The Upper Klamath River Canyon was inventoried in 2000 and 2001. Although these surveys did not include the analysis area, they provide insight to the herpetofauna that may be present within similar habitats of potential treatment units.

There have also been many incidental documented sightings, in and around the treatment areas, which can be referred to when characterizing herpetofauna. The section of Sheepy Creek near the treatment unit 39S-5E-29 and the section of Johnson Creek near the treatment unit 39S-5E-21, 28 were recently surveyed and rough-skinned newts, pacific tree frogs, and common garter snakes were documented.

Based on field reviews and informal and formal species/habitat documentations by qualified personnel, numerous reptile and amphibian species are known or thought to occur within or adjacent to the proposed treatment areas (Table 5). The sharptail snake, common and California mountain kingsnake, Cascades Frog and western toad have BLM "Bureau tracking Oregon (BTO)" status and Oregon Department of Fish and Wildlife (ODFW) "sensitive vulnerable" status (Oregon Natural Heritage Program species list - 2001).

Table 5. Herptile species suspected or known to be present in or directly adjacent to the project planning areas (Created 4/29/02 from Wildlife Sightings Database, UKRC Herpetological Inventory-2001, and herptile information from BLM Specialists).

Common Name	Scientific Name	Present or Suspected (P/S)
Northern alligator lizard	<i>Elgaria coerulea</i>	P
Western fence lizard	<i>Sceloporus occidentalis</i>	P
Western skink	<i>Eumeces skiltonianus</i>	P
Rubber boa	<i>Charina bottae</i>	P
Yellow-bellied racer	<i>Coluber constrictor</i>	P
Sharptail snake	<i>Contia tenuis</i>	S
Ringneck snake	<i>Diadophis punctatus</i>	S
Common kingsnake	<i>Lampropeltis getula</i>	S
California mountain kingsnake	<i>Lampropeltis zonata</i>	S
Gopher snake	<i>Pituophis melanoleucus</i>	P
Western terrestrial garter snake	<i>Thamnophis elegans</i>	S
Common garter snake	<i>Thamnophis sirtalis</i>	P
Western rattlesnake	<i>Crotalis viridis</i>	S
Long-toed salamander	<i>Ambystoma macrodactylum</i>	S
Rough-skinned newt	<i>Taricha granulosa</i>	P
Western toad	<i>Bufo boreas</i>	S
Pacific treefrog	<i>Pseudacris regilla</i>	P
Cascades frog	<i>Rana cascadae</i>	S
Pacific Giant Salamander	<i>Dicamptodon tenebrosus</i>	S

3.6 Aquatic Habitat

There are no Federal or state threatened, endangered or candidate aquatic species known to occur in the or immediately downstream of potential treatment units. Within the Jenny Creek watershed, Jenny Creek redband trout and Jenny Creek smallscale sucker are known to occur (Jenny Creek Watershed Analysis 1994). Jenny Creek smallscale sucker is listed as a species of concern by ODFW and is managed as Bureau Sensitive (BLM Manual 6840, ONHP 2001). Other fish species potentially present within the project areas are listed in Table 6.

Table 6. Fish species suspected or known to be present in or directly adjacent to the project planning areas.

Common Name	Scientific Name	Present or Suspected (P/S)
Sculpin sp.	<i>Cottus sp.</i>	S
Jenny Creek redband trout	<i>Oncorhynchus mykiss ssp.</i>	P
Jenny Creek smallscale sucker	<i>Catostomus rimiculus ssp.</i>	S
Klamath Speckled Dace	<i>Rhinichthys osculus</i>	P
Lamprey sp.	<i>Lampetra sp.</i>	S
Fathead minnow (introduced)	<i>Pimephales promelas</i>	S

Past management practices, including streamside timber harvest and removal of large woody debris (LWD) from the stream channel, have reduced instream LWD and affected sediment transport processes in the project reaches (Jenny Creek Watershed Analysis 1994, pages 36 and 42 to 43). Additionally, recent flood events (25-50 year return intervals) have pushed much of the existing LWD out of the stream into areas where it no longer interacts with the channel to provide habitat. Decay-resistant species such as ponderosa pine, lodgepole pine, incense cedar, and Douglas-fir are more desirable than white fir because of their longevity in the aquatic environment.

Potential limiting factors for redband trout in the area include lack of large woody debris, reduced stream shading, and lack of pool habitat. Large woody debris recruitment potential is diminished due to past harvest and increased risk of catastrophic fire. Stream shading is affected by reduced tree canopy height as a result of overstocked timber stands within some Riparian Reserves.

Two fish-bearing streams were identified adjacent to treatment units in the analysis area: upper Johnson Creek and Sheepy Creek.

Upper Johnson Creek

Extensive fish census or distribution surveys have not been conducted in the affected drainages. Observations of fish use were conducted in stream reaches adjacent to the proposed thinning units where fish presence was undocumented. Recently, the section of upper Johnson Creek in 38S-5E-29, 28, 21, and 27 was surveyed using hook-and-line sampling and ocular methods. Jenny Creek redband trout were documented. No complete barriers to migration were noted during the field review. However, lack of surface flow in late summer and early fall (during some years) upstream from the north boundary of section 28 seasonally limits the distribution of fish species within the upper portions of this drainage.

Most of the fish-bearing stream channels identified within the proposed treatment areas of upper Johnson Creek are dominated by open meadow habitats (grass and brush dominated) with low potential for woody

debris recruitment. Within the meadow habitat areas much of the adjacent standing timber is located outside of the proposed no-cut buffer.

Where stands of timber occur within the no-cut buffer, there is currently adequate LWD in the stream channel. However, much of this LWD has a high level of decay. In addition, some suppression mortality was occurring, causing contribution of small diameter trees to the stream channel. The existing LWD and ongoing suppression mortality are currently providing sufficient material to meet RMP guidance for LWD, although future recruitment of large LWD may be limited.

Sheepy Creek

Sheepy Creek is a tributary to Johnson Creek. The section of Sheepy Creek in 39S-5E-29 was surveyed using ocular methods. Klamath speckled dace were documented. No complete barriers to migration were noted during the field review. However, lack of surface flow in late summer and early fall (during some years) through the proposed treatment area in section 29 seasonally limits the distribution of fish species.

The stream channel in section 29 flowed in an open meadow with limited riparian vegetation (sedge dominated). Currently, there is very little LWD in the stream channel and there are few trees adjacent to the stream that would contribute LWD in the future.

The section of Sheepy Creek that flows through 39S-5E-21 has not been formally surveyed for fish presence/absence. This section of stream is considered intermittent and likely is seasonally used by the same fish species that inhabit Sheepy Creek in section 29. Most of this stream reach flows through a meadow, and has very little LWD in the channel.

The upper segments of Sheepy Creek within the proposed treatment areas (T39S-R5E-11, 12, and 13; T39S-R6E-7) are considered non-fish bearing based on topography, stream channel conditions, and downstream field reconnaissance.

3.7 Survey and Manage Species

Surveys

Pre-disturbance surveys are currently required in high priority habitat for two terrestrial mollusk and several aquatic mollusks (2001 Annual Species Review). The analysis area contains high priority habitat for these species. Required pre-disturbance surveys will be done according to protocol in the entire project area before ground disturbing activities take place. Surveys have been completed in portions of the proposed project area (see Table 7).

Survey and Manage species and their categories are listed in Table 1-1 of the 2001 Annual Species Review, released June 13, 2002. Refer to the 1994 Northwest Forest Plan, the 2001 ROD, and the 2001 Annual Species Review for further information on Survey and Manage species and Survey Protocols.

Maps and information on the areas surveyed can be found in the project binder.

Table 7. Protocol Surveys Completed - Johnson Creek and the West Fork of Johnson Creek (T38S-R5E-sections 28 and 29).

S&M Species Surveyed to Protocol	Aquatic Mollusks	Terrestrial Mollusks		Vascular Plants
	<i>Fluminicola sp</i>	<i>Helminthoglypta herleini</i>	<i>Pristoloma articum crateris</i>	<i>Cypripedium montanum</i>
Number of Populations Found	Several contiguous sites found	0	0	1
Jan. 2001 ROD Category (Table 1-1)	A (Manage All Known Sites)	B^4 (Manage All Known Sites)	B^2,4 (Manage All Known Sites)	C (Manage High Priority Sites)
2001 ASR (Table 1-1)	A (Manage All Known Sites)	E^4 (Manage All Known Sites)	B^2,4 (Manage All Known Sites)	C (Manage High Priority Sites)
Management Recommendations (Alternatives 1 and 2)	Maintain no-cut buffers for shade and water temperature protection. Protect sites from piling and burning. Consider instream placement of LWD near sites.	None found. No special management needed.	None found. No special management needed.	60 foot radius no disturbance buffer around site. Most of this area is included in the no-cut buffer described in Alternative 1. Alternative 2 would not affect the area.
Management to be Implemented	No cut areas along streams. No piling and burning within 10 feet of springs and seeps.	N/A	N/A	60-foot no-cut buffer around site.

Terrestrial Mollusks

As of October 2002 neither of the two terrestrial mollusks have been found in the KFRA.

- *Helminthoglypta herleini* (Oregon Shoulderband) Category E^4 (Rare, Status undetermined, pre-disturbance surveys in high priority habitat required). Habitat: Generally associated with talus and other rocky outcroppings.
- *Pristoloma articum crateris* (Crater Lake Tightcoil) Category B^2,4 (Rare, pre-disturbance surveys in high priority habitat required). Habitat: Greater than 610 meter elevation in moist conifer forest and mosses/other vegetation near wetland springs, seeps, and riparian areas.

Aquatic Mollusks

Fluminicola species have been found in the KFRA. All *Fluminicola* species are Category A (Pre-disturbance surveys required, manage all known sites.)

- *Fluminicola* n. sp. 1 (Klamath pebblesnail) Removed from Category A, however Manage all known sites until disposition is clarified in the special status species category.
- *Fluminicola* n. sp 3 (Klamath Rim pebblesnail) *Category A^*.
Habitat: Shaded areas in cold flows emanating from springs.
- *Fluminicola* n. sp. 16 (Shasta Springs pebblesnail) Category A
Habitat: Occurs only in springs usually with *Rorripa* sp. 744 to 915m

Fungi

Several species of Survey and Manage fungi species have been found during previous surveys in lands adjacent to potential treatment units. No pre-disturbance surveys are necessary for fungi, although incidental finds will be managed as Known Sites. Table 1-1 from the 2001 Annual Species Review lists fungi species and their category.

Habitat needs for fungi vary between different species. Some fungi species require coarse woody debris while others use duff, pine cones, or litter as substrate. Many fungi are dependent on specific tree species that act as mycorrhizal hosts. Fungi are sensitive to changes in microclimate conditions (light, wind, temperature, and moisture).

Vascular Plants

Cypripedium montanum (mountain lady slipper orchid), a Category C (Manage high priority sites) species, has been found in the KFRA. One population consisting of a single plant is documented in the proposed project area in T39S-R5E-3, adjacent to Cold Creek. Since this species is rare on the resource area, all populations should be managed for continued persistence of the species.

Great Gray Owls

Habitat needs and survey results for great gray owls are discussed in the Special Status Species portion of the Wildlife section of this document.

3.8 Botany

Botanical surveys have documented green-flowered ginger (*Asarum wagneri*), a Bureau sensitive species, in T38S R5E Sections 17, 20, 21, 28 and 29, but no populations of this species were found in sections 18, 19, 29, 30 and 31. Surveys have also documented green-flowered ginger from T39S R6E section 7, but no populations were found in the portions of T39S R5E section 3 which were surveyed.

Preliminary reports from current (2002) surveys have documented green-flowered ginger in T38S R5E Sections 27, 28, 33, and 34, in both uplands and riparian areas, with denser populations in the riparian areas. Botanical surveys of T39S R5E Section 13 are currently being conducted.

3.9 Noxious Weeds

St. John's wort (*Hypericum perforatum*), Dalmatian toadflax (*Linaria dalmatica*), diffuse knapweed (*Centaurea diffusa*), Canada thistle (*Cirsium arvense*), and Scotch broom (*Cytisus scoparius*) have been documented within the project area. Infested sites are mostly on roadsides and other disturbed areas. . Known sites of these species have been monitored and treated annually as needed since they were

discovered. Bull thistle (*Cirsium vulgare*) and mullein (*Verbascum thapsis*) were also noted in the area associated with disturbed areas.

3.10 Livestock Grazing

Portions of two active BLM cattle grazing allotments lie within the analysis area. These are listed below, along with the BLM leased maximum number of livestock and season-of-use:

- **Buck Mountain Allotment** (#0103) - 30 head from 5/15 to 9/15 (plus 300 head exchange of use for the U.S. Timberlands private)
- **Buck Lake Allotment** (#0104) – 50 head from 6/15 to 9/15 (plus 48 head exchange-of-use for intermingled private lands).

For a complete description of the grazing allotments, including historic and current use levels, allotment boundaries, and current range conditions, reference the following watershed or landscape analysis documents: *Topsy-Pokegama Landscape Analysis* (pages 135 to 154) and the *Spencer Creek Pilot Watershed Analysis* (pages 4-8 to 4-12). Both allotments have also had their grazing analyzed in Rangeland Health Standards Assessments (RHSA) that were completed in 2000: Buck Lake in the Spencer Creek RHSA and Buck Mountain in the Jenny Creek RHSA. Refer to those documents for more information.

3.11 Wild Horses

Portions of the Pokegama Wild Horse Herd Management Area (HMA) lie within the Jenny Creek watershed. The HMA boundary is defined by Jenny Creek on the west, Highway 66 on the north, and the Klamath River Canyon on the south and east. However, none of the proposed treatment areas fall within the designated HMA boundary. Horses from the HMA will occasionally wander north of Highway 66 and temporarily be within the analysis area, but this is not a common occurrence. Wild horses have been removed twice in recent years (1996 and 2000) and the population is at the low end of their determined appropriate management level (AML). Specifically, the most recent census count made in early 2002 indicates a current herd size of 25-35 head, which is well within the specified AML for the herd of 30-50 head.

For additional detail about the Pokegama HMA, reference the TPLA (pages 155-168), the 2002 Pokegama Wild Horse Herd Management Plan (HMAP), and the Klamath Falls Resource Area RMP/ROD and FEIS.

3.12 Cultural Resources

Native American use of the area spans many millennia. The project area was used by the Takelma, Klamath, and Modoc tribes, though activity was limited to seasonal hunting and gathering. Permanent occupation sites, such as villages, were established at lower elevations. In 1864, the area fell within the territory ceded to the United States by the Klamath Tribes. The Klamath Tribes consist of the Klamath, Modoc, and Yahooskin people. Although treaty rights are no longer federally recognized in the analysis area, the Klamath Tribes remain concerned about potential disturbance to cultural sites in the area. Continuous coordination between the BLM and the Klamath Tribes help keep the Tribes informed of potential activities on BLM-administered lands.

Historically (post-1846), after the establishment of the Applegate Trail, the analysis area was used for cattle ranching and logging. Logging began in the 1860s with a few small enterprising sawmills. The industry boomed in the early twentieth century both in and around the project area after the introduction of railroads nearby. Weyerhaeuser arrived in 1923 and began constructing logging roads. Today logging and ranching continue to be significant in the area.

Portions of the analysis area have previously been inspected for cultural resources. Prior to the initiation of project activities the remaining areas will be inspected and any discovered cultural resource sites will be avoided. Eight cultural resources inventories have been conducted within or near the analysis area (Table 8).

BLM Class III pedestrian methods were employed during the surveys. This generally involves systematically surveying the entire area using a transect interval of 30 meters or less. None of the surveys recorded archaeological sites within or near the current project area. However, an isolated obsidian flake was noted in 1997 during the West Rome II Timber Salvage Sale within the proposed project area on the east side of Johnson Creek.

Table 8. Completed cultural surveys within the analysis area.

Survey Name	Survey Date
Frosty Johnson Timber Sale Survey	1990
Kent Circle Timber Sale	1990
Saddled Again Timber Sale	1991
Frosty Again	1995
Frosty Protected Habitat Area Buffer Survey	1995
Silviculture Tree Plantation Surveys	1995
West Rome II Timber Salvage Sale	1997
North Frosty Cultural Resource Survey	1998

3.13 Fire and Fuels Management

Before the advent of fire suppression in the early 1900's, wildfires played a major role in shaping forest structure and composition within the analysis area. Most of the current timber stands developed from natural regeneration following wildfires that occurred during the last 200 to 600 years. In the mixed conifer and true fir stands that dominate the Jenny Creek watershed, natural fire regimes tended toward large fires and relatively long fire return intervals. Fires can reduce understory competition, increase light, provide nitrogen, increase biodiversity, reduce the vertical continuity of fuels, and stimulate germination of some fire-adapted species.

Beginning early in the 20th century, fire prevention and suppression efforts greatly intensified in order to protect public resources and private property from perceived risk of wildfire. The success of these efforts effectively eliminated fire from the landscape, leading to conditions favorable for the establishment of numerous small (often shade-tolerant and fire-intolerant) trees, shrubs, and other vegetation. The resulting additional biomass has caused an increase in crown and ladder fuels, which contribute directly to the destructive effects of recent fires on these landscapes. Forest health and biodiversity are being negatively affected from the exclusion of fire. The mortality of trees due to insects and disease, often a consequence of overcrowding, makes forests more susceptible to high-intensity, stand-replacing fires.

Many of the Riparian Reserves within the analysis area have intermittent or perennial streamflow, which supports relatively high plant and animal species diversity, compared to arid upland vegetation. Riparian

areas also sustain greater biomass per acre, which includes more multi-layered live and dead fuel loading. Cool ground fires that consume the available fuels are less likely to burn in riparian areas (the inner portion of Riparian Reserves) because of their higher fuel moisture, humidity, and shade. As described in the Vegetation section, the outer portion of Riparian Reserves is transitional between riparian areas and upslope areas and thus would have been more likely to experience low-intensity wildfire (prior to fire suppression).

High intensity wind-driven events are often more destructive in valley settings typical of Riparian Reserves because of the funneling effects of the topography, which increases the winds and dries out the fuels. The drainages in the Jenny Creek watershed are good examples of this phenomenon, and are likely candidates for a stand-destroying wildfire, unless actions are taken to reduce fuel loading and break up the vertical continuity of existing fuels.

3.14 Air Quality

The Clean Air Act requires each state to develop and implement a State Implementation Plan to ensure that National Ambient Air Quality Standards are attained and maintained for particulate matter. Analysis of effects on air quality from prescribed burning focuses on the production of “PM10” (particulate matter smaller than 10 microns). Under all the proposed alternatives, slash pile burning would comply with the guidelines established by the Oregon Smoke Management Plan and the Visibility Protection Plan. The Klamath Falls Special Protection Zone, the Medford-Ashland Designated Smoke Sensitive Area, and all Class One Visibility areas will be protected from smoke intrusions.

3.15 Recreation

The analysis area provides opportunities for dispersed recreation such as hunting, fishing, off-highway vehicle driving, camping, sightseeing, mountain biking, snowmobiling, and cross-country skiing. Developed recreation facilities include a small campground and a snowmobile trail network. Surveyor campground is a small rustic campground with limited facilities set in a grove of old growth conifers, near the headwaters of Johnson Creek. The Pederson snowmobile trail is a designated, groomed 11-mile trail that travels along the Keno Access road from the Burton Flat road intersection to the Spencer Creek Hookup road intersection.

The analysis area currently receives light dispersed recreation use most times of the year. KFRA ROD/RMP proposed a loop trail extending from Surveyor campground along Johnson Creek to the intersection with the 40-5E-2 road and return.

For additional information about recreation resources in the analysis area, refer to the Spencer Creek Watershed Analysis, pages 4-4 through 4-8. For general information about recreation in the Surveyor Mountain area, refer to the KFRA RMP/ROD pages 47-53, and RMP maps 2-8 and 2-10.

3.16 Visual Resources

The BLM has a basic stewardship responsibility to identify and protect scenic values on public lands. This is accomplished through the Visual Resource Management (VRM) program. Through this program, all BLM lands are inventoried and managed in specific VRM classes.

BLM lands within the analysis area contain a variety of landforms and scenic/aesthetic qualities, and thus include numerous VRM classes.

BLM lands within one-quarter mile of Surveyor campground and the Pacific Crest National Scenic Trail are VRM Class II. Management objectives for this class are for low levels of change to the characteristic landscape. Management activities may be seen but should not attract attention.

The rest of the analysis area is comprised of VRM Class III and IV lands. Management objectives for VRM Class III are to manage for moderate levels of change to the characteristic landscape. Management activities may attract attention but should not dominate the view of the casual observer. Class IV lands are to be managed for moderate levels of change to the characteristic landscape. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the effect of these activities through careful location, minimal disturbance, and repeating the basic elements of form, line, color, and texture found in the landscape.

For additional information about scenic resources in the analysis area, refer to the Klamath Falls RMP/ROD pages 43-44, and RMP maps 2-5.

4.0 ENVIRONMENTAL IMPACTS

The following resources are not present or would not be impacted by any of the alternatives: prime and unique farmlands, mining claims, paleontological resources, wilderness, roadless areas, research natural areas, special areas (Areas of Critical Environmental Concern), wild and scenic rivers, Native American religious sites, rural interface areas, or hazardous materials.

For all alternatives, no direct or indirect disproportionately high or adverse human health or environmental effects to minority or low-income populations are expected to result from implementation of the proposed action or the alternatives.

4.1 ACS Components

The following ACS objectives would not be affected: spatial and temporal connectivity, physical integrity of the aquatic system, sediment regimes (see water quality discussion), flow regimes (see hydrology discussion), and floodplain inundation. For more information on the ACS, refer to the Northwest Forest Plan ROD.

Landscape-Scale Features

Implementation of Alternative 1 would maintain and restore the species and structural diversity of forested stands within Riparian Reserves. The composition of stands that are currently composed primarily of white fir would be modified. Stand structural characteristics would shift from single canopy stands dominated by small diameter trees to more open stands consisting of evenly mixed age classes.

Under Alternative 2, the recovery of desired structural characteristics in young plantation-like stands within Riparian Reserves would be accelerated, but the composition of stands affected by fire suppression would not be changed.

Under the No Action alternative, successional processes and wildfire would control the future condition of forested stands within Riparian Reserves. It is likely that the proportion of white fir within Riparian Reserves would gradually increase as other shade-intolerant conifer species die and are not replaced.

Were it to occur, catastrophic fire could create openings that would be suitable for pine and Douglas fir regeneration (depending on fire intensity). In the short- to medium-term following catastrophic fire, there could be a lack of medium to large conifers.

Water Quality

Potential effects to water quality are discussed in the Hydrology section of this analysis.

Plant Communities

The ACS objective is to maintain and restore the composition and character of forested stands in order to provide riparian functions and a long-term supply of LWD.

Most treatment units would be located in confined or moderately confined reaches of Johnson Creek and other smaller streams. Riparian Reserves in these reaches provide LWD to the channel and canopy closure for shading. Implementation of Alternatives 1 and 2 would help enhance and restore the component of large, well-spaced trees that provide shade and LWD. In the long-term, Alternative 1 would be more likely to meet ACS objectives since it would include restoration thinning within mature fire-suppressed stands as well as in plantation-like stands.

The No Action alternative would result in long-term negative effects to the riparian resources. The continued presence of large amounts of shade-tolerant white fir will result in a decline in forest health (stand resiliency) and an increased fire hazard. This would result in negative impacts to the riparian zones ability to provide LWD to the channel and canopy closure for shading.

Habitat

Potential effects to wildlife and vegetation habitat are discussed in the Plant Communities, Wildlife Habitat, Aquatic Habitat, and Survey and Manage Species sections of this analysis.

4.2 Hydrology

Streamflow

Direct and indirect impacts to water quantity would be minimal under Alternatives 1 and 2. Due to the extent of previous timber harvest activities and road construction in the analysis area, it is likely that stream flow increases or changes in the timing of peak flows, if any, have already been realized. Removal of understory trees would reduce transpiration demand and could result in slightly increased water availability for remaining vegetation and/or baseflow. This would be most likely to occur in Alternative 1, since the stands treated in Alternative 2 have lower leaf areas and hence lower transpiration demand, and therefore probably do not use all available water.

The risk of high-intensity wildfire associated with the No Action alternative presents the potential for loss of vegetation cover and detrimental impacts to soils. Were this to occur over a large area, peak flows and baseflow would likely increase in the short- to medium-term.

Water Quality

Direct and indirect short-term impacts to water quality from sedimentation would be minimal under all

alternatives due to the low level of soil surface disturbance from the proposed treatments.

Shade plays an important role in regulating heat input to streams. Neither Alternative 1 nor 2 would affect the vegetation communities immediately adjacent to streams. In the short-term, shade from the outer portion of the Riparian Reserves would be reduced. Enhanced growth of residual trees and regeneration of understory shrubs and trees will mitigate the effect of short-term reductions in overstory shading.

Under Alternative 1, enhancement of pine and Douglas fir trees would provide for development of a canopy of well-spaced, larger trees that would provide shade and recruitment of LWD to the stream. This should have a beneficial effect on stream temperatures due to increased shading and increased functionality of channel-forming processes associated with LWD. See the Aquatic Habitat section below for more discussion of these effects.

Under Alternative 2, the recovery of plantation-like stands within Riparian Reserves would be accelerated, thereby accelerating the recovery of riparian functions that beneficially affect water quality. This alternative would reduce the potential for short-term detrimental effects caused by removing existing sources of stream shade, but would also reduce the extent of area affected beneficially in the long-term.

Alternatives 1 and 2 would reduce the risk of canopy loss and sediment delivery associated with catastrophic fire, although Alternative 1 would accomplish this more effectively than Alternative 2. Sediment delivery to streams from road surfaces and ditchlines could be increased as a result of hauling operations. Because hauling associated with the proposed action would be minimal, would be limited to the dry season (or periods when sufficient snowpack is on the ground), and would occur on improved (gravel) roads (when within Riparian Reserves of fish-bearing streams), potential increases in sediment delivery from hauling would be negligible. Suspension of hauling during major storm events would further decrease the potential for sediment delivery to ditchlines and streams.

Under the No Action alternative, shade would not be reduced in the short term. The risk of catastrophic fire would remain high, thereby creating some risk that canopy closure could be drastically reduced were a fire to occur. If future fires do not remove white fir, streams in the analysis area would continue to be adequately shaded.

4.3 Soils

Potential direct and indirect adverse impacts to soils and soil productivity include compaction, displacement, removal of soil surface cover, and changes in nutrient status. Under Alternatives 1 and 2, the potential for negative impacts to the soil resource would be low due to the use of manual labor rather than mechanical equipment. Burning of piles of cut material would cause some negative impacts to soils directly under the piles. High temperatures from concentrated burning could cause negative impacts to soil nutrient and organic matter reserves. Although there is potential to create a large number of piles (especially in areas where existing down wood is piled), the size of individual piles would be small, so the total impact to the treatment area would be relatively minor.

Short-term impacts from soil displacement during treatment activities would be minor due to the low impact methods proposed. The use of small cable yarding systems would reduce the extent of areas affected by pile burning but could lead to increased soil displacement.

Under both action alternatives, long-term positive aspects to soil resources may be realized by both a revitalized growth of understory riparian species, and an increase in understory biomass and biodiversity.

Increasing understory ground cover would reduce soil erosion.

There would be no long-term negative impacts to the soil resources from any of the action alternatives. Under the No Action alternative there will be no immediate risk to soil resources, however this action may pose a long-term risk if a catastrophic wildfire were to occur. Severe and rapid reduction in vegetation due to wildfire could reduce soil stability. This would result in an increased soil erosion hazard and a decrease in site productivity for other resources in the short term. A long-term risk of reduced understory groundcover and/or biodiversity could occur with the No Action alternative.

4.4 Vegetation

Under Alternative 1, and to a lesser degree under Alternative 2, small diameter thinning would enhance the pine and Douglas-fir component (early seral, shade-intolerant species) and improve the health and resiliency of mature forested stands. The thinning of overstocked understories around shade intolerant species like pines and Douglas-fir would improve the vigor of residual trees. Additional growing space would enhance the resiliency of residual trees and reduce the ongoing mortality of these species. Thinning would also provide additional water, nutrients, and solar radiation to the residual trees resulting in increased growth rates. This would result in an increase in the number of large trees within the riparian area to provide shade for the stream and future large woody debris. Increased snow loads that would occur within “donut cuts” could damage some small pines.

White fir stands are very sensitive to disturbance, and ongoing mortality may continue after the treatment but should be minimal. Some mortality could occur as a result of pile burning. Removal of cut trees from Riparian Reserves would reduce the potential for this type of mortality. A limited extent of mortality is beneficial, as it provides snag recruitment habitat.

Under the No Action alternative, these positive effects would not be realized. With no treatment the white fir stands would continue to increase in both density and area with resultant negative impacts to the pine and Douglas-fir from the competition for space, light, soil nutrients, and water.

4.5 Wildlife Habitat

In regards to the following discussion, although there would be no direct detrimental impacts from implementing the No Action alternative, the risk of a wildfire would remain high in areas with high fuel loads or with overstocked understories that are prone to stress-induced mortality. Were a large high intensity wildfire to occur, there would be widespread losses of thermal refugia and hiding cover.

Special Status Species - Wildlife

Bald Eagles (Haliaeetus leucocephalus)

There are presently no known bald or golden eagle sites within the analysis area. If treatment units are located near bald eagle habitat, a BLM wildlife biologist will initiate the “streamlined consultation” process and implement appropriate Project Design Features.

Northern Spotted Owl (Strix occidentalis caurina)

Under Alternatives 1 and 2, the greatest impacts to individual nest sites would occur as a result of disturbance during the nesting and fledgling periods. These impacts would be of short duration, but could

cause nest sites to be abandoned during project activities. If a nest site were located during project implementation, either buffering the nest area or temporarily halting operations adjacent to the site would reduce these impacts.

Impacts to owl species would be similar to those experienced by other raptor species, although alteration of habitat may impact the prey base. Owls rely heavily on the small rodent population. Leaving a diversity of species and patches of shrubs to act as cover and habitat structure should reduce the overall impacts to the prey base.

Under Alternatives 1 and 2, a restriction on the operating season from March 1 to July 31 within one-quarter mile of active spotted owl nest sites would be required. The dates may be subject to change upon consultation with the BLM wildlife biologist. This operating restriction would minimize impacts to nesting spotted owls in all of the action alternatives.

Other Species of Concern

Northern Goshawk (*Accipiter gentilis*)

Under Alternatives 1 and 2, the greatest impacts to individual nest sites would occur as a result of disturbance during the nesting and fledgling periods. These impacts would be of short duration, but could cause nest sites to be abandoned during project activities. If a nest site were located during project implementation, either buffering the nest area or temporarily halting operations adjacent to the site would reduce these impacts.

Under Alternatives 1 and 2, impacts to potential northern goshawk habitat would be similar to that of the northern spotted owl. A seasonal closure would need to be implemented near active nest sites during times of goshawk activity.

Survey and Manage Avian Species

Although the great gray owl (*Strix nebulosa*), flammulated owl (*Otus flammeolus*), white-headed woodpecker (*Picoides albolarvatus*), and black-backed woodpecker (*Picoides arcticus*) are all classified as Survey and Manage Species, surveys are required for only the great gray owl.

Under Alternatives 1 and 2, impacts to local populations these species would likely be low. Daytime activities associated with the proposed project may disturb some nesting and foraging sites, but these impacts would occur only in the short-term. In general, snags would not be removed. In areas of dense shrubs, thinning would potentially increase foraging opportunities by providing openings in which to hunt. Leaving pockets and islands of shrubs would assist in maintaining the prey base.

Applying seasonal restrictions in known great gray owl territories would minimize impacts from disturbance. Currently, there are no known great gray owl nest sites within or near the affected areas. However, if an activity center or nest site were found, a restriction on the operating season from March 1 to July 31 within one-quarter mile of the activity center or nest site would be in effect. The dates may be subject to change upon consultation with the BLM wildlife biologist. This operating restriction would minimize impacts to great gray owls.

Other Terrestrial Wildlife Species

Ungulates

Under Alternatives 1 and 2, disturbance from the project may have a short-term direct effect on individual elk and deer. Disturbances during the calving or fawning time frame (generally, May 1 through June 15) would have the greatest potential to have detrimental effects on individuals, especially the young. Such disturbances would have a short duration and overall would have minimal impacts to the species.

The removal of thickets of small trees would result in a short-term loss of forage and hiding cover for big game. These species are especially reliant on shade cover during the summer months as refugia from heat and insects. Leaving clumps of vegetation for hiding cover and foraging is essential in order to limit impacts to elk and black-tailed deer. The thinning of white fir thickets would create areas for rejuvenation of vegetation that may create new foraging opportunities. Reduced stand densities would lead to improved air circulation and create cooler areas for ungulates. It would also reduce fuels hazards and reduce the risk of high-intensity wildfire.

The removal of small trees may also reduce hiding cover, especially in areas near roadways where increased pressure from hunting may occur. Leaving a strip of small trees and brush along open roads (and other roads where needed) would assist in minimizing pressures from traffic and road-side hunters. In plantations, brushing would encourage growth of trees and move the stand towards potential habitat.

Furbearers

Under Alternatives 1 and 2, disturbance from the project may have a short-term direct effect on individual furbearers. Riparian areas and associated thickets are commonly used as migration corridors, hiding cover, foraging and denning areas. However, these disturbances would have a short duration and overall cause minimal impact to the species. In the short- to medium-term, reduced stand densities would result in reduced habitat value for these species. In the medium- to long-term, vertebrate and invertebrate populations would be increased as a result of invigorated understories and enhanced microhabitats. This would provide a larger prey base for furbearers.

Bats

Under Alternatives 1 and 2, short-term disturbance of individuals being pushed from snags or thickets may occur. These disturbances however would have a short duration and overall would have minimal impacts to the species. Snags should be retained wherever possible.

Upland Birds

Under Alternatives 1 and 2, the disturbance and thinning within Riparian Reserves would have a substantial short-term effect on Blue and Ruffed Grouse, and Mountain and California quail. Grouse and quail spend a great deal of time utilizing riparian and adjacent mixed conifer thickets for hiding, roosting, nesting, foraging, and wintering habitat. Wild turkeys also use these zones during certain parts of the year. If all PDFs are followed the effect to upland birds should be minimal.

Raptors

Under Alternatives 1 and 2, the greatest impacts to individual nest sites would occur as a result of disturbance during the nesting and fledgling periods. These impacts would be of short duration, but could cause nest sites to be abandoned during project activities. If a nest site were located during project implementation, either buffering the nest area or temporarily halting operations adjacent to the site would reduce these impacts.

Impacts to owl species would be similar to those experienced by other raptor species, although alteration of habitat may impact the prey base. Owls rely heavily on the small rodent population. Leaving a diversity of species and patches of shrubs to act as cover and habitat structure should reduce the overall impacts to the prey base.

Impacts to the Northern Goshawk (*Accipiter gentilis*), Northern Spotted Owl (*Strix occidentalis caurina*), Flammulated Owl (*Otus flammeolus*) and Great Gray Owl (*Strix nebulosa*) are discussed under special status species.

Woodpeckers

Under Alternatives 1 and 2, impacts to local populations would be minimal. Daytime activities associated with the proposed project may disturb some nesting and foraging sites, but only in the short-term.

Landbirds

Eleven of the 20 species that may occur within the project area are associated with riparian/shrub habitats (Table 4). Of these, four have declining population trends according to The Partner's in Flight Handbook on Species Assessment and Prioritization. Six of the 15 bird species that are associated with the sapling/pole habitat and may occur in the analysis area have declining population trends (Table 4) (Panjabi 2001).

Alternatives 1 and 2 may result in short-term detrimental disturbance to landbirds that utilize riparian shrubs for breeding. Species that utilize pole/sapling habitat within treatment units may also be affected by disturbance. If the proposed action takes place during the breeding season for these birds (May through July), there would be direct losses of reproduction for those species associated with these habitat types. Losses would likely be greater under Alternative 1 than Alternative 2 due to the larger acreage of pole/habitat types that could be treated.

The proposed action would change the character of microhabitats within and adjacent to treatment units. Pole/sapling habitat types would be directly affected, while riparian/shrub types would be indirectly affected by changes in microclimate and spatial arrangement of adjacent habitats.

There would be a loss of breeding habitat for passerine bird species that utilize conifer trees in the < 7" dbh size class. The trees that would be removed are primarily small diameter trees with a limited amount of foliage and suitability for nesting. Responses to this change could include displacement, adaptation, or reduction in local populations. Detrimental impacts would be reduced by the implementation of no-cut buffers, thermal clumps, and other project design features.

Thinning and piling of small diameter trees would result in conditions that would favor the growth of forbs, grasses and shrubs. Increased understory diversity would be favorable to bird species that are dependent upon shrub habitats associated with forest. However this habitat is not limiting in the KFRA. Over the long term, effects of the proposed action on the suitability of the sapling/pole forest for nesting are not expected to be significant.

Herptiles

The actions proposed in Alternatives 1 and 2 may have indirect negative impacts to native herptiles. The main impact may be habitat degradation via short- to medium-term (until understory vegetation recovers) reductions of understory cover within Riparian Reserves used for hiding and hunting cover (Brown et al., 1995). Recent surveys have shown that native reptiles and amphibians species inhabit some of the areas of proposed action, including the special status Cascades frog (*Rana cascadae*) found in upper Johnson Creek. Project design features should allow for sufficient protection of Cascades frogs in the treatment areas.

These alternatives may have indirect beneficial effects to herpetofauna by reducing the likelihood of a catastrophic wildfire. In the long term, these treatments may provide increased habitat diversity, therefore improving microsite characteristics and enhancing prey base for herptiles. In order to stay within the objectives of the KFRA RMP, leaving 10% untreated (a “mosaic” approach) could satisfy the main wildlife habitat objective by enhancing and maintaining biological diversity and ecosystem health in order to contribute to healthy wildlife populations. No-cut areas adjacent to streams, as well as thermal clumps and buffers around special status plant sites, would provide untreated areas to ensure adequate habitat diversity.

4.6 Aquatic Habitat

Mature, large, canopy-forming trees within one site potential tree height (160 feet) of the stream contribute nearly all of the potential stream shading and large-diameter wood entering the aquatic environment (FEMAT, 1993). Long-term impacts to the aquatic environment could be beneficial under Alternatives 1 and 2 if the objectives of increased residual tree growth, increased vigor and abundance of desired tree species, and reduced risk of catastrophic fire are realized. The ability of thinning to positively affect the aquatic environment in the long term diminishes as the width of the no-cut area increases.

Alternative 1

The type and location of treatments within Riparian Reserves would vary depending on stand conditions and restoration objectives. Treatments could range from no treatment to thinning with spacing in order to provide the benefits of large trees and down wood to the system. The trees retained in the riparian treatment areas and the existing LWD in the stream channel would ensure that a supply of LWD is maintained. The retention of trees in larger size-classes would provide the majority of potential future LWD available to the stream channel. Some trees would be directionally felled towards stream channels within units adjacent to streams that are identified (on the basis of habitat surveys) as lacking adequate LWD. This would help ensure that instream LWD volumes are adequate in the short- to medium-term.

The proposed treatments will move the treated stands toward some level of restoration immediately upon completion; specifically by reducing stem densities, increasing average tree diameter, and increasing species diversity. As the treated stand ages, ecosystem processes consistent with old-growth stands will

begin to evolve, including LWD recruitment regimes, where trees would fall into the stream channel at a variable rate. This would provide the streams with a variety of size, species, and decay classes of LWD. Reestablishment of late-successional LWD recruitment regimes would reduce the risk of instability in the stream channels. Steady rates of LWD recruitment from large, desirable tree species would improve habitat complexity and increase the amount of persistent pool habitat in the long term (Sullivan et al, 1987). Pools provide high quality rearing habitat for redband trout and can decrease width/depth ratios, contributing to lower stream temperatures.

Canopy closure after treatment would be dependant on existing vegetative features and the extent of treatment units. Canopy closure would be retained in the area immediately adjacent to the stream and would diminish upslope. As noted in the Hydrology section of this analysis, minor, slightly beneficial, changes to water temperature and streamflow regimes are expected to occur as a result of project implementation. Therefore, no substantial detrimental impacts to fisheries resources are expected to occur as a result of water temperature or peak/base flow alterations caused by the proposed action.

The use of low impact yarding techniques is proposed for use in some units. Yarding would be seasonally restricted to periods when soil moisture is low or when snow depths are adequate to protect soil resources. These limitations would minimize the potential for ground disturbance and sediment delivery to stream channels. During yarding activities, directionally falling trees away from designated no-cut buffers would be expected to prevent impacts to stream channels.

Indirect and cumulative impacts could potentially include increased sediment delivery to streams from road surfaces and ditchlines during hauling operations. As discussed in the Hydrology section, potential increases in sediment delivery due to hauling would be negligible, and would not be expected to measurably affect salmonids.

Alternative 2

Because thinning would occur only in early seral stands and no yarding or hauling would occur, there would be no detrimental effects to aquatic resources under this alternative. In the long-term, accelerated recovery of young forest stands would benefit aquatic resources due to increased stream shading and increased recruitment of large LWD.

No Action Alternative

There would be no thinning within Riparian Reserves within the analysis area at this time. No direct impacts to the fisheries resource would occur. Indirect and cumulative impacts associated with current watershed conditions and identified in the affected environment section will continue to occur.

Under the No Action alternative stands within Riparian Reserves would maintain largely uniform age/size and species distributions until shade tolerant tree establishment and/or natural mortality (either chronic or catastrophic allow understory development. This type of development will contain a simplified size and age class stand structure not typical of old-growth stand characteristics. Recruitment of large wood to streams and riparian areas could be affected, due to the lack of diversity of stand characteristics. The stream function could be affected by the lack of stand diversity. LWD recruitment patterns and instream structural diversity would be simplified, which would be dissimilar to desired instream structure and patterns over the long term.

4.7 Survey and Manage Species

Under Alternatives 1 and 2, the short- to medium-term loss of canopy cover, the removal of downed logs, and piling and burning would cause minor short-term effects to Survey and Manage fungi and mollusk species. Survey and Manage fungi and terrestrial mollusks are commonly associated with the microclimates that coarse woody debris and conifer thickets provide. Leaving some woody debris and thermal clumps should help mitigate any short-term effects. In the long term, fungi and mollusks would benefit from increased canopy closure and the presence of larger pieces of coarse woody debris. Fungi would also benefit from an increased diversity of tree species that are important mycorrhizal hosts.

Aquatic mollusks (*Fluminicola* sp.) have been found throughout the main channel of Johnson Creek. They are sensitive to changes in water temperature and sedimentation. In the long term aquatic mollusks would benefit from improved water quality.

The Best Management Practices and Project Design Features in place for maintaining water quality, minimizing soil compaction and protecting Riparian Reserves would ensure that important habitat components for Survey and Manage mollusks, fungi, and vascular plants are maintained. Required pre-disturbance surveys will be done according to protocol in the entire project area before ground disturbing activities take place. Surveys have been completed in portions of the proposed project area (Table 7). During project layout and implementation, Survey and Manage “known sites” would be buffered and managed according to current Northwest Forest Plan Management Recommendations and with input from the local specialist (as described in Table 7). The recommended management actions would minimize detrimental impacts to known sites.

Under the No Action alternative Survey and Manage species would probably continue to benefit in the short term from small LWD and shade from existing trees. In the long term a stand replacing fire could be detrimental to available LWD, canopy closure and the duff layer that provides habitat to Survey and Manage species. Survey and Manage fungi could also be detrimentally affected by the lack of species diversity. No surveys or management of known sites would be necessary under this alternative.

4.8 Botany

Green-flowered ginger (*Asarum wagneri*), a Bureau sensitive species, occurs in the project area with the highest abundance in riparian areas of units scheduled for initial treatments. Therefore, Alternative 1 would have the potential to produce low to moderate negative direct physical impacts from ground-disturbing activities. Alternative 2 would have less potential for these impacts since the treatments would be implemented over a smaller area, and the area with the highest concentration would not be directly affected by treatments. Alternative 3 (no action) would not directly impact the existing populations of green-flowered ginger.

The recommendation for preserving long-term viability for green-flowered ginger is to provide protection from disturbance to the largest and most vigorous populations, and to those that occur in unique or unusual habitats. Designing the no-cut areas proposed within the treated area to include the densest populations of green-flowered ginger would reduce the direct impacts in Alternatives 1 and 2. Also, if placement of cut material in openings is implemented to avoid patches of green-flowered ginger, then the potential for these impacts is further reduced.

Since the presence of dense stands of white fir (*Abies concolor*) was found to preclude or reduce the abundance of green-flowered ginger, too little sun exposure may be as limiting as too much sun exposure

for this species. Therefore, the proposed treatment may benefit green-flowered ginger by reducing canopy cover and increasing sunlight reaching the forest floor. This benefit may offset over the long-term any direct impacts from physical disturbance to this species in Alternatives 1 and 2, and would be greatest in Alternative 1 and decrease in Alternative 2 as the amount of riparian area, and area of most abundant green-flowered ginger, treated is decreased. Alternative 3 (no action) would not realize any of this benefit.

4.9 Noxious Weeds

Alternatives that produce more intense or more extensive ground disturbance would create conditions under which noxious weeds would have a competitive advantage relative to other plant species. Thus Alternative 1 would have the highest probability, followed by Alternative 2, to facilitate the establishment and/or spread of noxious weed species. However, this is expected to be minimal due to the manual methods employed, and the limited surface disturbance expected under all alternatives. Some temporary increase in the abundance of bull thistle and mullein may occur in the most disturbed areas. However, these species tend to decrease in abundance without continued physical disturbance and, therefore, are not targeted for active control actions within the resource area.

Weed prevention measures (see Project Design Features) will reduce the potential for management activities to result in the establishment or spread of noxious weeds. The consequences of incorporating these proposed project design features into the proposed project would likely reduce the probability of spreading noxious weed seeds into and/or beyond the proposed project area. Reasonable cleaning of the construction equipment involved in operations would likely remove a large amount of the noxious weed seed from the machinery. It is assumed that cleaning the equipment will not remove 100% of the noxious weed seed, but the inclusion of the proposed design features into project operations would be consistent with Bureau Manual policy and Executive Order, would have a high probability of preventing, controlling, or reducing the spread of noxious weeds on BLM lands, and would prove to be a prudent step to take in reducing the need for costly weed eradication in the future.

4.10 Livestock Grazing

Impacts to cattle and wild horse grazing would be essentially nil under any of the alternatives. The removal of smaller trees (and brush) could open up the vegetation communities allowing for a temporary increase in desirable herbaceous forage species. However, forage is not thought to be a limiting factor in the area and most cattle and horse use occurs on the lands owned by U.S. Timberlands. Most of the treatment areas are also not in areas where livestock frequent and wild horses rarely wander as far north as the proposed project areas. There would be no impacts to rangeland improvements projects (e.g. water development, fencing) from any of the alternatives.

4.11 Wild Horses

Potential effects to wild horses are discussed in the Livestock Grazing section of this analysis.

4.12 Cultural Resources

A review of existing inventory files revealed that approximately 50% of the project area has been previously surveyed (See Table 8). Only one isolate artifact was found. Isolates have no scientific value under BLM Regulation 8111.21(F) and will not be avoided. The remaining project areas will be surveyed for cultural resources and submitted to the State Historical Preservation Office (SHPO) for concurrence

prior to the initiation of ground disturbing activities. If sites are discovered during that survey, they will be marked in the field and avoided during treatment. In addition, sites will be monitored after project implementation.

Previous surveys used BLM Class III surface survey methods and did not incorporate subsurface techniques. Consequently, sites may not have been discovered due to dense forest ground litter. It is preferred, in addition to avoiding the site, that the least ground disturbing methods are undertaken. If additional cultural resources are encountered during treatment activity, then work should be halted and the resource area archaeologist should be called in for further evaluation.

Since manual treatment methods are to be employed during project work, limited surface disturbance is expected during the proposed alternative. Under all action alternatives, the potential to encounter, or disturb, subsurface archaeological deposits appears limited based on survey results and the nature of disturbances anticipated. The No Action alternative would present the least immediate hazard to any cultural resources that have remained undetected during surface survey. Such sites, if any, could also be impacted from the relatively high temperatures associated with the burning of concentrated piles. With the no action alternative, long-term hazards could be greater assuming increased forest fuels and consequently greater risks for catastrophic fires.

4.13 Fire and Fuels Management

The proposed fuel reduction efforts would generally reduce the risk of catastrophic wildfire. In order to minimize the risks of fire escape and adverse environmental effects, the proposed action includes chainsaw thinning and piling rather than imitating nature through broadcast burning. Nevertheless, the effects of this thinning project would be somewhat similar to a natural event (removal of small trees, brush and ground vegetation). The long-term goal would be to reduce the components of live ladder fuels and residual ground fuels to a level that would allow the re-introduction of natural and prescribed fires, to attain a more natural fire regime than what has occurred over the last century. Returning these habitats to historic fire interval levels, or management close to these levels, would generally increase the quality of habitat.

All action alternatives would reduce fuel loading within the project area and break up the vertical continuity of the vegetation. Alternative 1 includes treatment of the generally denser mature stands that contain extensive ladder fuels and larger fuels loads, so it makes the most impact in reducing the chances for a stand-replacing wildfire. Alternative 2 focuses on plantation-like stands that are less dense and have lower fuel loading, and thus would have less impact than Alternative 1. The No Action alternative continues the trend toward more volatile conditions and greater risk of destructive wildfires.

4.14 Air Quality

Alternatives 1 and 2 propose to burn some or all of the slash piles, thereby emitting varying amounts of particulate matter. The No Action alternative would have no impacts on air quality in the short term, but there is a high probability of wildfire occurring in the untreated stands, leading to future impacts to air quality of major proportions, and during the months when impacts are most damaging.

Since manual treatment methods will be used to reduce fuels in the riparian areas, the impact on air quality will be limited. Piled slash tends to burn hotter and cleaner than green trees or scattered fuels in contact with the forest floor. Because of the ability to manage emissions from slash burning (through timing of burns with projected weather patterns), and because of the relative isolation of the area, the air

quality goal should be easily met. Wildland fire, on the other hand, is a random event and smoke and particulate matter cannot be managed. Alternative 1 would have a greater effect than Alternative 2 on air quality, since it includes the most treatment acres and involves cutting and piling larger trees. Local impacts would be transitory in nature and no long-term smoke impacts are expected. The timing and intensity of burning would be planned to prevent visual impairment on travel ways and mitigate smoke intrusions into developed areas.

Prescribed burning emissions, under all alternatives, are not expected to adversely effect annual PM10 attainment within the Klamath Falls Special Protection Zone or the Medford-Ashland sensitive areas. Any smoke intrusions into these areas from burning the slash piles are anticipated to be light and of short duration. Smoke dispersal techniques will be used to avoid the transport and dispersal of smoke and particulates into portions of sensitive areas. The Oregon Department of Forestry smoke management policy will be implemented.

4.15 Recreation

Under Alternatives 1 (proposed action) and 2 only temporary, minor disruption to recreational uses would occur during treatment activities. Short-term disturbances to recreationists from truck traffic, equipment noise, and dust associated with treatment activities would be expected under Alternative 1, but less so than under Alternative 2.

Plowing snow off roads for winter harvesting activities could occur under Alternative 1 and could cause negative impacts to snowmobilers if truck hauling occurred on the designated, groomed trail that runs over the Keno Access and Spencer Creek Hookup roads. The plowing would temporarily decrease the available length of the trail, and may also disrupt some of the commonly used snowmobile parking/staging areas in and adjacent to the analysis area.

The impacts associated with the proposed selective harvest or thinning, described in Alternatives 1 and 2 would not approach or exceed those described in the Klamath Falls Resource Area Final RMP (pages 4-104-108).

Under Alternative 3 (no action), no impacts to recreation resources would be expected.

4.16 Visual Resources

Under Alternatives 1 (proposed action) and 2 proposed treatment activities would have minimal negative impacts to visual resources. The use of hand thinning, bucking and piling, preservation of larger pines and the treatment of larger trees and debris with low impact yarding systems would reduce impacts to visual resources.

Long-term visual resources within the analysis area would likely be positively impacted by proposed treatments, as thinning and follow-up prescribed fire activities would greatly reduce the opportunity for catastrophic wildfire within the treated areas.

Under Alternative 3 (no action), no impacts to visual resources would be expected.

5.0 PROJECT DESIGN FEATURES

Best Management Practices

The following Best Management Practices would be required under Alternatives 1 and 2 to eliminate or minimize impacts to natural resources.

Riparian Reserve Treatment

1. **For Alternative 1 only**, a “no-entry” buffer would be designed along stream channels. No-cut widths would be 20 foot on each side of non-fish bearing stream channels and 40 feet on each side of fish bearing streams to protect microclimates adjacent to the streams.
2. All refueling and maintenance operations will take place 40' or more from the stream and outside of all thermal clumps. The areas must be selected so that a potential spill would not be capable of running into water. Fuels, if stored on site, must be kept in a lined and bermed location capable of holding the entire stored fuel volume. Adequate spill response materials should be included within the contract.
3. Yarding would be seasonally restricted to periods when soil moisture is low or when snow depths are adequate to protect soil resources. Directional felling away from stream channels may be required for some yarding operations.
4. No new roads or landing would be constructed within Riparian Reserves.
5. If runoff and erosion are evident, felled trees may be placed on old skid trails to act as water bars.

Burning and Fuels Treatment

1. All cut material will be lopped and/or bucked into 48" or shorter pieces and must be piled in landings or other areas identified by the fuels specialist or contract administrator.
2. Piles will be located so as to limit damage to residual standing trees during burning.
3. Slash piles will not be located in draws or concave surfaces which would drain directly into fish-bearing streams if overland flow occurs. No piles will be built and no fire will be ignited within the 40 feet on each side of fish-bearing streams and 20 feet on each side of intermittent streams. Slash piles will not be located within protective buffers associated with Survey and Manage known sites or Special Status plant species.
4. Plan all slash pile burning to occur during the cold and/or wet months of the fall, winter and spring, to reduce damage to the site from high intensity burning and to facilitate control of the units being burned.
5. Future prescribed fires will be allowed to back into Riparian Reserves, contingent on maintaining a light intensity burn.

Wildlife

1. A strip of understory vegetation (small trees and brush) will be left along open roads to provide visual

screening and reduce disturbance to wildlife.

2. Up to three mixed-conifer thickets per mile of stream will be marked as “no-cut” to provide thermal refugia habitat. These thickets will vary in size and may overlap with roadside buffers (see above), Survey and Manage protection buffers, and special status plant and animal protection buffers.

At present, not all of the treatment units that will be implemented under this EA have been identified. When treatment units are laid out, the following PDFs will be implemented as appropriate:

3. A seasonal operating restriction will be implemented from March 1 to July 31 within one-quarter mile of the activity center or nest site for the Northern Spotted Owl, Northern Goshawk and Great Gray Owl, and may be implemented for Red-tailed Hawks (at the discretion of the KFRA wildlife biologist).
4. A seasonal operating restriction will be implemented from January 1 to August 31 within one-quarter mile of the activity center or nest site of Bald Eagles (in the event that nest sites are established or discovered).
5. Seasonal operating restrictions and no-treatment buffers (see KFRA ROD/RMP page 38) would be implemented for Northern Spotted Owl and Northern Goshawk and could be implemented for Cooper’s Hawk and Sharp-shinned Hawk.
6. To protect ungulate calving and fawning, a seasonal restriction would be implemented from May 1 to June 15 for some treatment units, as determined by wildlife biologists.

Survey and Manage Species

1. Pre-disturbance surveys will be done according to current Survey Protocol in all treatment units.
2. Survey and Manage sites found in the project area will become Managed Known Sites.
3. Known sites will be managed according to current Management Recommendations and the Klamath Falls Management Zone Team.

Botany and Noxious Weeds

1. Required botanical surveys for special status plant species and noxious weeds will be completed in treatment units prior to any ground disturbance. Many portions of the analysis area have already been surveyed (see discussion in the Affected Environment section). All sites located will be managed to minimize detrimental impacts.
2. All vehicles and equipment (including chainsaws) will be cleaned off prior to operating on BLM lands. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts is required and may be accomplished with a pressure hose.
3. Noxious weeds in the immediate area of operations shall be mowed to ground level prior to the start of project activities.
4. All equipment and vehicles operating off of main roads shall be cleaned off prior to leaving the job site when the job site includes noxious weed populations. Removal of all dirt, grease, and plant parts that

may carry noxious weed seeds or vegetative parts is required and may be accomplished with a pressure hose.

Cultural Resources

1. Required cultural surveys will be completed prior to any ground disturbance.
2. All cultural resources will be marked in the field prior to the start of the project and all project activities shall avoid disturbance to these resources. If project activities result in the discovery of new cultural resources, all ground disturbing activities shall cease and the KFRA Archeologist shall be notified. Resumption of activities in that area will be allowed only after all mitigation fieldwork has been conducted.

Air Quality

1. Pile burning will be timed and managed to comply with the Clean Air Act, the Oregon Smoke Management Plan and the Oregon State Implementation Plan. The Klamath Falls Special Protection Zone, the Medford-Ashland Designated Smoke Sensitive Area, and all Class One Visibility areas will be protected from smoke intrusions. Burning will be conducted to prevent visual impairment on travel ways.

Recreation Resources

1. Ensure that haul routes are signed to alert recreationists to truck traffic in the area.
2. Ensure that dust abatement is applied on haul routes, especially near more popular recreation areas such as Surveyor Campground, the Pacific Crest Trail, and parking/staging areas.
3. If winter logging occurs, sign the Keno Access, Burton Flat, Spencer Creek Hook-Up, and Miners Creek roads to alert winter recreationists, particularly snowmobilers, that winter logging operations are occurring.
4. If winter logging occurs, have contractor snowplow alternate parking/staging areas for snowmobile trails, if necessary, to avoid conflicts between winter logging and snowmobiling.
5. If winter logging occurs, designate temporary alternate snowmobile trail routes to avoid winter logging operations.
6. If winter logging occurs, inform snowmobile clubs and other winter sports groups of any planned/potential winter logging operations.

Visual Resources

1. Minimize clearing size for cable yarding corridors, retain small trees in corridors when possible, minimize devegetation to soil where possible, and reseed/replant any areas that are devegetated.

6.0 REFERENCES

- Andelman, S.J. and A. Stock. 1994. Management, Research and Monitoring Priorities for the Conservation of Neotropical Migratory Landbirds that Breed in Oregon. Washington Natural Heritage Program. Washington Department of Natural Resources. Olympia, Washington.
- Brown, H.B., R.B. Bury, D.M. Darda, L.V. Diller, C.R. Peterson, and R.M. Storm, 1995. Reptiles of Washington and Oregon. Seattle Audobon Society, Seattle, Washington.
- Cochran, P.H., 1998. Examples of mortality and reduced annual increments of white fir induced by drought, insects, and diseases at different stand densities. USDA Forest Service Research Note PNW-RN-525.
- Franklin, J.F., and C.T. Dyrness, 1969. Vegetation of Oregon and Washington. USDA Forest Service Research Paper PNW-80.
- Maser, C., R.F. Tarrant, J.M. Trappe, and J.F. Franklin, 1988. From the forest to the sea: a story of fallen trees. USDA Forest Service General Technical Report PNW-GTR-80.
- Nature Conservancy, The. 2001. Oregon Natural Heritage Program (ONHP) Species List. Portland, Oregon.
- Olson, D.L., 2000. Fire in riparian zones: A comparison of historical fire occurrence in riparian and upslope forests in the Blue Mountains and southern Cascades of Oregon. Master's Thesis. University of Washington, Seattle.
- Panjabi, A. 2001. The Partners in Flight Handbook on Species Assessment and Prioritization
- Roninger, R. 2001. Herpetological Inventory of the Upper Klamath River Canyon Klamath Falls Resource Area, Lakeview District, Bureau of Land Management. Klamath Falls, Oregon.
- Saab, V.A. and T.D. Rich. 1997. Large-scale conservation assessment for neotropical migratory land birds in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-399. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 56 p. (Quigley, Thomas M., ed. Interior Columbia Basin Ecosystem Management Project: scientific assessment).
- Sullivan, K.T., T.E. Lisle, C.A. Dolloff, G.E. Grant, and L.M. Reid, 1987. Stream channels: the link between forests and fishes, in Streamside Management: Forestry and Fishery Interactions, ed. E.O. Salo and T.W. Cundy, Institute of Forest Resources Contribution 57, pp. 39-97.
- USDA SCS, 1993. Soil Survey of Jackson County Area, Oregon. 694 pages, plus maps.
- USDA Forest Service et al., 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Report for the Forest Ecosystem Management Assessment Team.
- USDI BLM and USDA Forest Service, 1994. Final Supplemental Environmental Impact Statement on Management Habitat for Late-Successional and Old-Growth forest Related Species Within the Range of Northern Spotted Owl (FSEIS).

USDI BLM, 1994. Jenny Creek Watershed Assessment and Analysis. Ashland Resource Area, Medford District. Medford, Oregon.

USDI BLM. 1995. Klamath Falls Resource Area Record of Decision and Resource Management Plan and Rangeland Program Summary.

USDI BLM and USDA Forest Service, 1995. Spencer Creek Pilot Watershed Analysis.

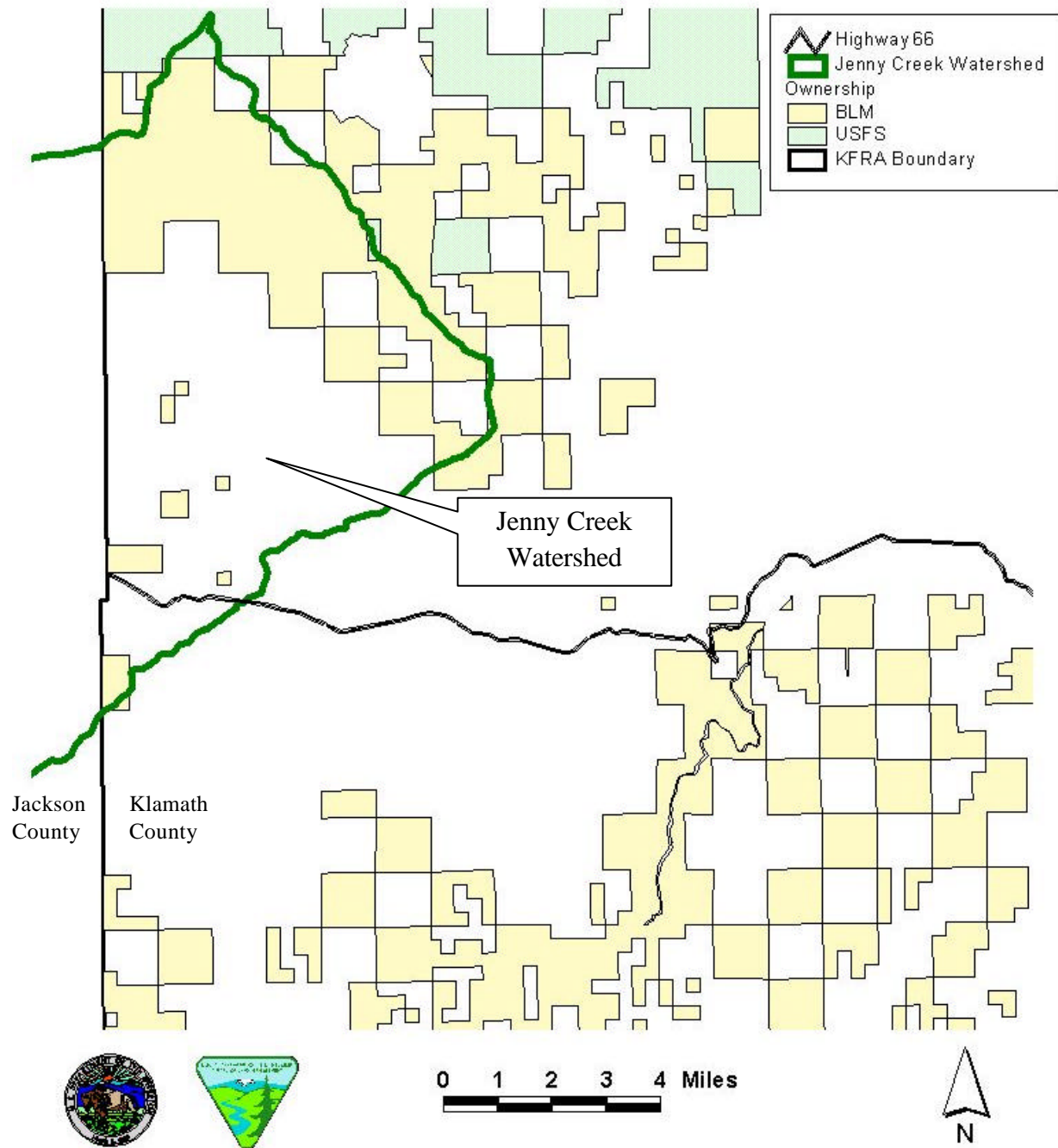
USDI BLM, 1995. Frosty TS EA Frosty Forest Health Treatments Environmental Assessment (EA-OR-014-95-03)

USDI BLM, 1996. Topsy/Pokegama Landscape Analysis.

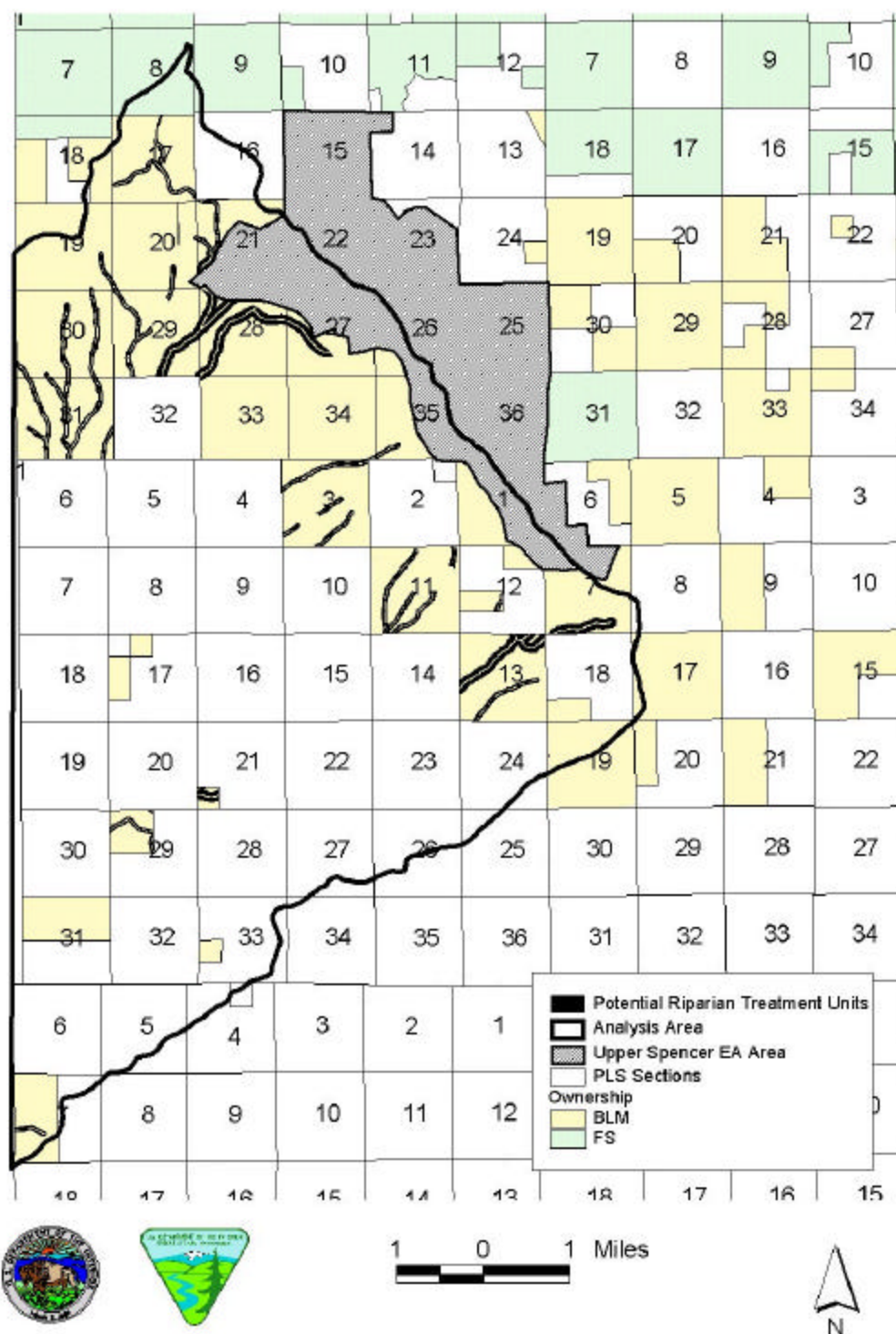
USDI BLM and USDA Forest Service, 1997. Interior Columbia Basin Ecosystem Management Project/Eastside Draft Environmental Impact Statement (ICBEMP).

USDI BLM and USDA Forest Service, 2001. Survey and Manage Annual Species Review.

7.0 MAPS AND PHOTOS



Map 1. Location of the Jenny Creek watershed.



Map 2. Riparian Reserves on BLM-administered land in the analysis area.



Photo 1. Riparian treatment unit adjacent to Spencer Creek prior to understory thinning.



Photo 2. Riparian treatment unit adjacent to Spencer Creek following thinning with a prescription similar to that proposed in Alternative 1. Note piles of cut material.